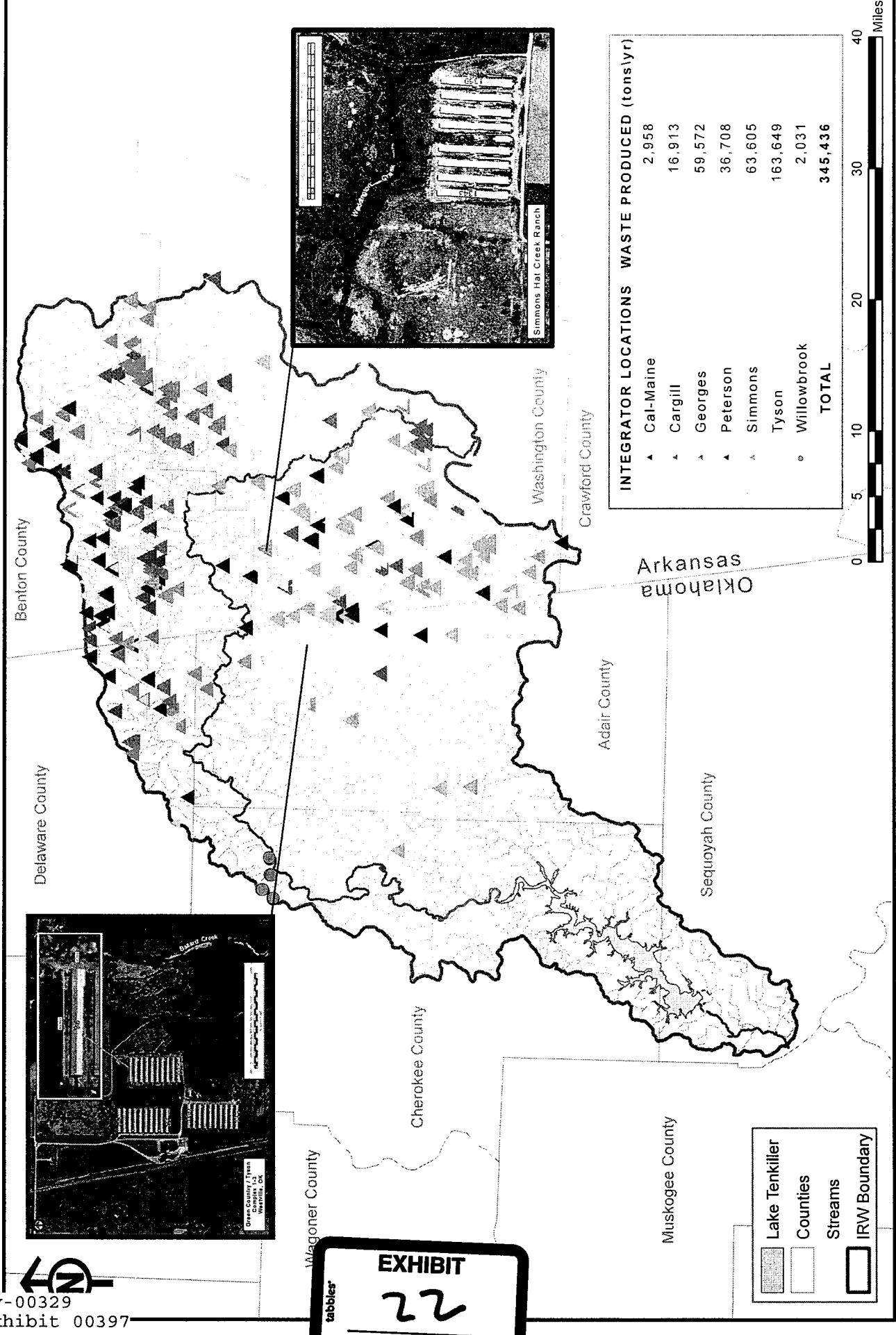


Active Poultry Houses Located In The Illinois River Watershed (2005-2006)



**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OKLAHOMA**

STATE OF OKLAHOMA,)	
)	
Plaintiff,)	
)	
v.)	Case No. 05-cv-329-GKF(PJC)
)	
TYSON FOODS, INC., et al.,)	
)	
Defendants.)	

DECLARATION OF J. BERTON FISHER, Ph.D.

I, J. Berton Fisher, Ph.D., hereby declare as follows:

A. BACKGROUND

1.

I am a geochemist and geologist with expertise in the transport and fate of materials in the environment. I hold a Ph.D. and M.S. in Earth Sciences from Case Western Reserve University and a B.S. in Geology and Geophysics from Yale University. I am a Certified Professional Geologist, a Registered Professional Geoscientist in the State of Texas and a Registered Professional Geologist in the State of Mississippi. I have published scientific papers regarding technical environmental matters in peer-reviewed publications, and I have given numerous technical presentations regarding environmental matters at scientific meetings. I have worked on the engineering and scientific aspects of numerous environmental litigation, regulatory and transaction matters, including, specifically, environmental matters related to the land disposal of poultry wastes. I have worked professionally as a geochemist and geologist since 1973 and have worked on matters related to agricultural, industrial, petroleum and mining environmental contamination for nearly twenty-five years. My work experience includes consulting, industrial and academic positions. My experience in technical environmental matters includes site investigations, review of site investigation data, analysis of the chemical and physical characteristics of environmental samples, historic research on industrial and agricultural activities and processes, petroleum exploration and production, mining, the environmental chemistry of organic and inorganic contaminants and studies of the fate and transport of organic and inorganic contaminants in soils, sediments and water, including the collection of undisturbed cores of unconsolidated lake sediment and the geochronological analysis of undisturbed cores of unconsolidated lake sediments using natural and anthropogenic radioactive nuclides and paleontological markers.

2.



Since 1997 I have worked on matters related to the environmental contamination by poultry wastes including the chemistry, generation and land disposal of poultry wastes, the identification of poultry waste constituents in the environment, their fate and transport in the environment, the effects of poultry waste contaminants on water quality, and the management of poultry waste land disposal in eastern Oklahoma and western Arkansas. I have served as a consultant to the Tulsa Metropolitan Utility Authority and the City of Tulsa with respect to poultry waste issues from 1997 to the present.

3.

I was retained by the Oklahoma Attorney General, beginning in 2004, to evaluate, provide analysis regarding and to advise on matters pertaining to poultry waste generation, poultry waste disposal practices and the fate and transport of land applied poultry waste.

B. EXPERT REPORT

4.

On May 15, 2008, I submitted an Expert Report to the Defendants in the above-captioned litigation (attached hereto as Ex. 1). This Expert Report contains statements, findings, analyses and opinions with respect to poultry waste generation, poultry waste disposal practices and the fate and transport of land applied poultry waste in the Illinois River Watershed (“IRW”).

5.

In my Expert Report, I find that “[a]t present, nearly all...poultry waste is land disposed near where the waste is generated.” (Expert Report, Ex. 1 at 4). This is a true and correct finding. I based this finding in large part on official records produced by the Oklahoma Department of Agriculture, Food and Forestry that identify locations where poultry waste has been land applied in relation to locations where that poultry waste was generated, deposition testimony of fact witnesses and experts and documents produced by the Defendants which show locations where poultry waste has been land applied in the IRW. *Id.* at f.n. 4.

6.

“The terrain of the bulk of the Illinois River Watershed is mantled karst. ...In mantled karst terrains the dissolution of carbonate units beneath a covering of soil and regolith creates expanded infiltration pathways including, sinkholes, solution expanded fractures, faults and caves. The fracturing and faulting within the Illinois River Watershed, combined with karstification (which enlarges subsurface faults and fractures) produces areas of high permeability, and results in a circumstance in which shallow ground water aquifers are particularly susceptible

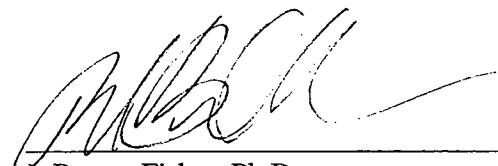
to impact by surface contamination, including contamination by bacteria, that can readily travel from the soil surface to surface water and ground water during rainfall events.... Within such a karst terrain, there is little attenuation (reduction) of contaminants as they move from the land surface into and through the karst aquifer. Thus, land application of poultry waste to the karst terrain of the Illinois River Watershed means that constituents of this waste (including bacteria) travel readily through the soils and underlying geologic media to discharge at and into ground water springs and surface streams throughout the Illinois River Watershed. Further, because of the ready flow of water through a karst terrain of the type present in the Illinois River Watershed, there is strong interaction between surface water flow and ground water flow so that surface waters readily become ground water and ground water readily becomes surface water. The phenomenon is readily shown by the numerous springs and gaining and losing streams found within the Illinois River Watershed.

Soils within the Illinois River Watershed are formed mostly from the weathering of carbonate rocks, and are of low natural fertility....The soils are typically loams and are often rocky due to the presence of chert fragments. Loam soils are mixtures of sand, silt, clay and organic matter. Depending on the relative proportion of sand, silt and clay, these soils will be susceptible to infiltration or surface runoff....[S]oils more susceptible to run off dominate in the eastern and western portions of the Illinois River Watershed, while soils that are more susceptible to infiltration dominate in the central portion of the Illinois River watershed...Thus, contaminants deposited on the surface within the Illinois River Watershed are prone to runoff from soils in about half of the watershed and are prone to infiltration through soils in the remaining half of the watershed."

(Expert Report, Ex. 1 at 44-6).

I declare under penalty of perjury, under the laws of the United States of America,
that the foregoing is true and correct.

Executed on the 5TH day of March, 2009.



J. Berton Fisher, Ph.D.

1 IN THE UNITED STATES DISTRICT COURT FOR THE
2 NORTHERN DISTRICT OF OKLAHOMA
3
4

5 W. A. DREW EDMONDSON, in his)
6 capacity as ATTORNEY GENERAL)
7 OF THE STATE OF OKLAHOMA and)
8 OKLAHOMA SECRETARY OF THE)
ENVIRONMENT C. MILES TOLBERT,)
in his capacity as the)
TRUSTEE FOR NATURAL RESOURCES)
FOR THE STATE OF OKLAHOMA,)
)
9 Plaintiff,)
)
10 vs.) 4:05-CV-00329-TCK-SAJ
)
11 TYSON FOODS, INC., et al,)
)
12 Defendants.)
13 - - - - -
14 THE VIDEOTAPED DEPOSITION OF
15 TOMMY DANIEL, PhD, produced as a witness on
16 behalf of the Plaintiff in the above styled and
17 numbered cause, taken on the 26th day of November,
18 2007, in the City of Fayetteville, County of
19 Washington, State of Arkansas, before me, Lisa A.
20 Steinmeyer, a Certified Shorthand Reporter, duly
21 certified under and by virtue of the laws of the
22 State of Oklahoma.

23
24
25

**TULSA FREELANCE REPORTERS
918-587-2878**



1 **A** I've mostly talked to growers that are
2 involved in the day-to-day operation.

3 **Q** Did any of -- talking to growers, does that
4 involve solely within the state of Arkansas or was
5 it elsewhere, too, that you did that work?

09:34AM

6 **A** Well, I would say probably other places. We
7 would go to conferences. We might talk to the
8 extension specialists for poultry in Georgia or
9 Alabama.

10 **Q** Poultry is pretty big in the Georgia area, is
11 it not, and Alabama?

09:34AM

12 **A** Yeah, yes.

13 **Q** Over what period of time would you say that
14 you've conducted this kind of survey or discussions
15 with growers involving their practices?

09:34AM

16 **A** Well, it's been ongoing since August of '89
17 and, you know, that changes.

18 **Q** Sometimes more often than not? I mean when
19 you say changes, you might be more involved doing it
20 than other times?

09:34AM

21 **A** No. I mean the practices do change and you
22 have to try and keep up.

23 **Q** Let me ask you then about the practice of
24 removing the poultry waste and litter from the barn.
25 What generally has been the practice of dealing with

09:35AM

1 that poultry waste generated at the barn?

2 A It's generally cleaned out once a year.

3 Q When it's cleaned out, what usually becomes of
4 it?

5 A It's land applied.

09:35AM

6 Q And when you say land applied, it's spread on
7 land. It's my understanding it's generally not
8 incorporated when it's spread; is that true?

9 A It is not incorporated at the present time
10 generally, common practice.

09:35AM

11 Q And that's been the common practice in the
12 past; correct?

13 A Yes.

14 Q Based on your experience and knowledge, how
15 long has spreading poultry waste when it's removed
16 from the barns been done by the poultry growers?

09:35AM

17 A Well, certainly to my knowledge since '89, and
18 I'm told that it's occurred prior to that as a
19 fertilizer for the pasture and also been told that
20 prior to that, the soils were very infertile, and
21 this was a good practice that the growers liked and
22 that's how the cow-calf operation became so

09:36AM

23 L prevalent in northwest Arkansas.

24 Q In your educating yourself with regard to
25 common practice in the poultry industry, did you

09:36AM

1 talked about earlier; is that correct?

2 A Of land applying it?

3 Q Yes, sir.

4 A Yes. Go ahead.

5 Q And when you're talking about it in this 10:19AM
6 article, are you referencing a specific area or is
7 that just generally true?

8 A I think we're implying that it's generally
9 true nationwide, not only for litter but for the
10 animal waste. 10:19AM

11 Q All right.

12 A And I will point out that using poultry manure
13 as animal feed is no longer practiced.

14 Q Okay. It was tried and used for a while,
15 wasn't it? 10:19AM

16 A Apparently.

17 Q All right. You go on to say in the same
18 article at the same place, this application,
19 referring to the land application of the poultry
20 waste, usually occurs no more than a few miles from 10:19AM
21 where it's produced. I think further down it says
22 under transportation, it's usually restricted to six
23 to twelve miles. Did you gain that information from
24 your discussions with those in the industry that you
25 talked about earlier? 10:20AM

1 A Yes. It's generally -- excuse me -- from
2 talking to growers. I think there have been some
3 studies, surveys done.

4 Q Generally speaking can you tell me why it's
5 limited to the six to twelve miles we're talking
6 about moving it? 10:20AM

7 A Well, it's some degree of a physical thing.
8 Poultry litter is a very bulky material, bulk
9 density of about one, point one, point five, and it
10 is cost of transport. I think there's studies today
11 that would say that litter is worth about 30 or \$40
12 and you can afford to transport it about 30 or 40
13 miles. 10:20AM

14 Q In 1995 you're reporting it was limited to as
15 much as six to twelve miles; correct? 10:21AM

16 A Yes.

17 Q When you use the term poultry waste or poultry
18 litter in this article and others, does that include
19 the waste generated from broiler chickens?

20 A Yes. 10:21AM

21 Q Does it include the waste generated from
22 layers?

23 A We probably refer mostly to litter from
24 broiler chickens and very limited layer operations.
25 That's liquid material or have been. 10:21AM

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OKLAHOMA**

STATE OF OKLAHOMA,)
vs. Plaintiff,) Case No. 4:05-cv-00329-TCK-SAJ
TYSON FOODS, INC., et al.,)
Defendants.)

**OBJECTIONS AND RESPONSES OF STATE OF OKLAHOMA TO
SEPARATE DEFENDANT CARGILL TURKEY PRODUCTION LLC.'S
AMENDED FIRST SET OF INTERROGATORIES
AND REQUEST FOR PRODUCTION
PROPOUNDED TO PLAINTIFFS**

GENERAL OBJECTIONS

1. The State objects to these discovery requests to the extent that they seek the discovery of information that is protected by the attorney-client privilege and/or the work product doctrine.
2. The State objects to these discovery requests to the extent that they seek the discovery of information that is already in the possession of defendant, is obtainable from another source that is more convenient, less burdensome or less expensive, or is as accessible to defendant as it is to the State. As such, the burden of obtaining such sought-after information is substantially the same, or less, for defendant as it is for the State.
3. The State objects to these discovery requests to the extent that they are overly broad, oppressive, unduly burdensome and expensive to answer. Providing answers to such discovery requests would needlessly and improperly burden the State.
4. The State objects to these discovery requests to the extent that they improperly seek identification of "all" items or "each" item of responsive information or to state "with



to violation of the Enterococcus, E. coli, total fecal coliform, turbidity, and total phosphorus water quality standards criteria. Flint Creek violates water quality standards by failing to meet its Public and Private Water Supply, Primary Body Contact Recreation, and (in segment OK 121700060010) Aesthetic beneficial uses. Further, Flint Creek is listed as impaired due to violating the Enterococcus, E. coli, total fecal coliform, and total phosphorus water quality standards criteria in segment OK 121700060010; and the Enterococcus and nitrate water quality standards criteria in segment OK 121700060080. Finally, because all are designated as "Scenic River" in OAC 785:45, Appendix A, water quality standards are further violated by these streams failing to meet the Antidegradation Requirements found at OAC 785:45-3.

Further responsive information includes, but not limited too, SB 972 Report, BUMP Reports, 2002 and 2004 Integrated Water Quality Assessment Report, and the Safe Drinking Water Information System. Additionally, responsive documents may be found in the business records of the state which will produced at scheduled and/or yet to be scheduled agency productions pursuant to Fed.R.Civ.P. 33(d).

INTERROGATORY NO. 9: State completely and in detail the facts upon which you base the allegations in Your Amended Complaint at ¶ 53 that "[a]t many locations, phosphorus and other hazardous substances, pollutants and contaminants have built up in the soil to such an extent that, even without any additional application of poultry waste to the land, the excess residual phosphorus and other hazardous substances, pollutants and contaminants will continue to run-off and be released into the waters of the IRW in the future" and identify every witness upon whom You will rely to establish each fact.

RESPONSE TO INTERROGATORY NO. 9: The State incorporates its general objections set forth herein, and the State further objects because it improperly uses the defined term "You."

Moreover, to the extent that this interrogatory seeks facts which are protected by attorney client privilege, work product protection, or which have been prepared in anticipation of litigation or trial by the State's counsel, expert consultants, or agents, which have not yet been identified as testifying experts in this matter. The State further responds that this interrogatory is unduly burdensome and is a premature contention interrogatory.

Subject to and without waiving the foregoing objections, as a general matter, subject to ongoing discovery of the particulars relevant to the Cargill entities, based on ODAFF inspector soil test results of poultry operations in the summer and fall of 2002 in several counties of Oklahoma in the scenic river watersheds, and an STP threshold of 120 pounds per acre, it was found that 77% of sites tested exceeded an STP (soil test phosphorus level) of 120, and 33% of samples exceeded an STP of 300. See SB 972 report at p. 12-13. Soil nutrient experts at both Oklahoma State University and the University of Arkansas agree that an STP level greater than 65 to 100 is of no value to crops. SB 972 report at p. 3. Once excessive STP levels are achieved, it takes many years of cropping to remove excess phosphorus, during which time soluble and particulate phosphorus can be washed off the site in surface water or may enter ground water.

Confined poultry operations have tons of phosphorus enriched feed brought onto the farm by defendants. Much of that phosphorus passes through the animals and is excreted in manure. Crops most readily respond to nitrogen, so growers have historically applied enough manure to meet crop nitrogen needs, resulting in applying several times the needed amount of phosphorus. Repeated applications of manure based on nitrogen needs causes phosphorus to accumulate in the soil, causing high soil test phosphorus (STP) levels. For land with high STP levels, appreciable amounts of soluble phosphorus can exist in runoff water and can significantly impact water quality in nearby streams and lakes. High levels of STP can require many years of

continuous crop harvesting for removal, with no additional phosphorus from any source during that time. University of Arkansas Cooperative Extension Service, *Soil Phosphorus Levels: Concerns and Recommendations*, Daniels, et. al. p 2-3, Exhibit 2 hereto.

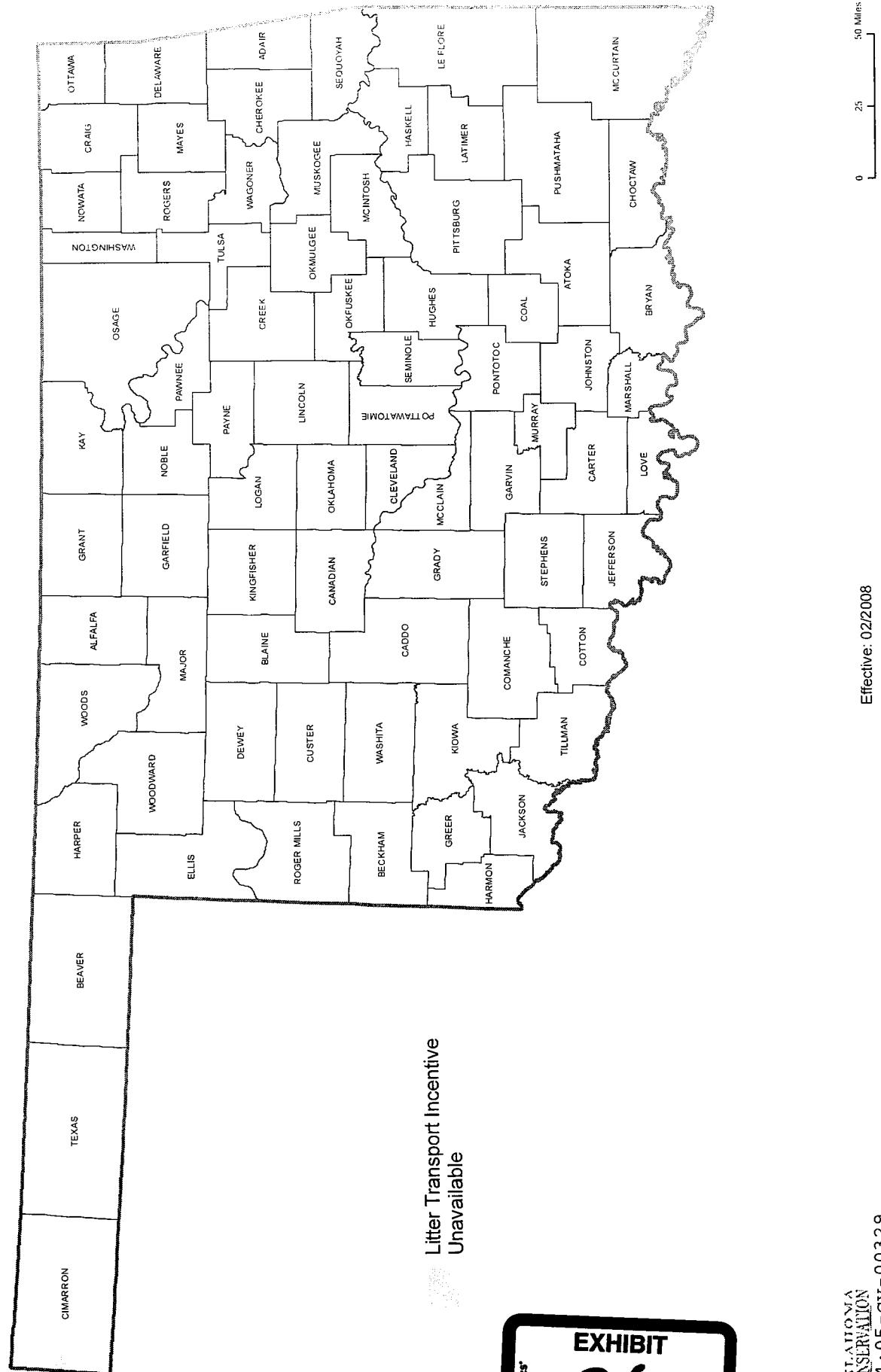
Once STP levels become excessive, further applications of phosphorus will increase the potential for phosphorus movement and do not provide any potential agronomic benefits. Forages with a high yield potential can be used to remove phosphorus from high phosphorus fields, but it is a slow process. For instance, cutting and removing a Bermuda grass crop of five tons per acre for thirty years would reduce high STP soils by about 100 points. Oklahoma State University Cooperative Extensions Service, *Managing Phosphorus from Animal Manure*, No. F-2249, Zhang, et al., p 3, Exhibit 3 hereto. In further response to this interrogatory and pursuant to Fed. R. Civ. P. 33(d), information sought in this Interrogatory, and whose production is not objected to herein, may be found within the business records being provided to Defendants in onsite agency productions.

Because discovery is ongoing, the State has not determined which witnesses it will use to support its claims referenced in this interrogatory.

INTERROGATORY NO. 10: Provide a detailed description of the subjects of discoverable information held by each of the persons listed on Exhibit A of Your Initial Disclosures.

RESPONSE TO INTERROGATORY NO. 10: The State objects to this interrogatory on the grounds that it is overly broad, oppressive, unduly burdensome and expensive to answer and subverts the purpose of Rule 26(a) disclosures. The Advisory Committee Notes to the 1993 amendments to the F.R.Civ.P. indicate that the purpose of the disclosures in the State's Exhibit A is to disclose the identity of witnesses who, if their potential testimony were known, might

Litter Transport Incentive Unavailable to Litter moved into the Highlighted Area



IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OKLAHOMA

STATE OF OKLAHOMA,)
)
 Plaintiff,)
)
v.) Case No. 05-cv-329-GKF(PJC)
)
TYSON FOODS, INC., et al.,)
)
 Defendants.)

DECLARATION OF BERNARD ENGEL, Ph.D.

I, Bernard Engel, Ph.D., hereby declare as follows:

A. BACKGROUND

1.

I hold a B.S. and M.S. in Agricultural and Biological Engineering from the University of Illinois and a Ph.D. in Agricultural Engineering from Purdue University. I am a registered professional engineer in the State of Indiana. Since 1988, I have been a faculty member in the Purdue University Department of Agricultural and Biological Engineering. I am currently Department Head and Professor within this program. My research, teaching and outreach expertise are in environmental engineering and the application of information systems technologies to environmental problems. I have extensive experience in developing and applying computer models, databases, and geographic information systems to a range of environmental issues. In this regard, I have developed hydrologic/water quality models and decision support systems that are widely used by consultants and local, state and federal agencies. My work has allowed me to obtain extensive experience in applying models and information technologies to assess nutrient and pesticide movement in surface waters of watersheds and into watershed



groundwater. I have published more than 100 articles on related topics in peer reviewed scientific journals.

2.

I have been retained by the Oklahoma Attorney General to evaluate the generation and land application of poultry waste within the Illinois River Watershed (“IRW”). In addition, I have been asked to evaluate the movement of this waste and its constituents into streams, rivers, and groundwater within the IRW and into Lake Tenkiller.

B. EXPERT REPORT

3.

On May 22, 2008, I submitted an Expert Report to the Defendants in the above-captioned litigation (attached hereto as Ex. 1). This Expert Report contains statements, findings, analyses and opinions related to my evaluation of the generation and land application of poultry waste within the IRW and the movement of this waste and its constituents into streams, rivers, and groundwater within the IRW and into Lake Tenkiller.

4.

The following excerpts from my Expert Report consist of true and correct statements, findings, analyses and opinions:

5.

“Elevated soil P from poultry waste application to pasture can also contribute substantially to P losses in runoff. Figures 8.2 and 8.3 show the results of a study in which poultry litter was applied to Bermuda grass plots (Sharpley et al., 2007). The soil P levels increased, resulting in greatly increased surface runoff of P, even

6 years after litter application was stopped. For high levels of STP, P loss with runoff may occur for decades and beyond....”

Surface soil (0 to 5 cm) Mehlich-3 P and mean annual dissolved P concentration of surface runoff and subsurface flow (70 cm depth) from bermudagrass before, during, and after poultry litter application ($11 \text{ Mg ha}^{-1} \text{ yr}^{-1}$; $140 \text{ kg P ha}^{-1} \text{ yr}^{-1}$).

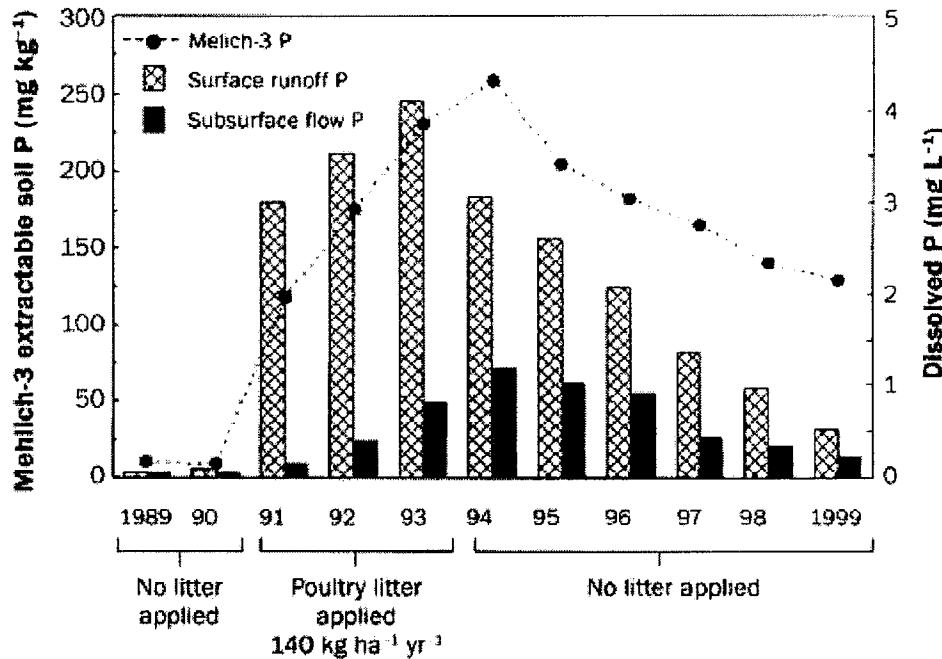


Figure 8.2. P Loads in Runoff Due to Elevated Soil P Levels (From Sharpley et al. (2007))

Phosphorus budget of poultry litter application, phosphorus uptake by bermudagrass, and total phosphorus loss in surface and subsurface flow from a Ruston fine sandy loam in Oklahoma.

Year	Litter P added (kg ha ⁻¹ yr ⁻¹)	Bermudagrass		Total P loss in flow		
		Yield (kg ha ⁻¹ yr ⁻¹)	P uptake (kg ha ⁻¹ yr ⁻¹)	Surface (kg ha ⁻¹ yr ⁻¹)	Subsurface (kg ha ⁻¹ yr ⁻¹)	P balance
Before application						
1989	0	3,500	5.9	0.2	0.1	-6.2
1990	0	4,010	6.4	0.2	0.1	-6.7
During application						
1991	140	8,110	16.9	3.8	0.1	+119.2
1992	140	8,210	18.6	5.1	0.4	+115.9
1993	140	8,510	20.0	7.8	0.5	+111.7
After application						
1994	0	8,040	22.5	5.6	0.7	-28.8
1995	0	7,120	18.2	4.2	0.6	-23.0
1996	0	6,920	15.2	2.2	0.5	-15.9
1997	0	7,510	19.2	1.6	0.4	-21.2
1998	0	7,230	18.7	1.3	0.2	-20.2
1999	0	6,900	17.4	0.9	0.2	-18.5
Total	420	76,050	179.0	32.9	3.8	+206.0

Notes: Balance of P was determined as litter P added - P uptake by grass + P loss in surface runoff + P loss in subsurface flow. Negative values indicate a net loss of P from the plots and positive values a net gain of P.

Figure 8.3. P Loads in Runoff Due to Elevated Soil P Levels (From Sharpley et al. (2007))”

(Expert Report, Ex.1 at 38-39)

6.

“...Phosphorus Mass Balance

The movement of phosphorus into and out of an area (e.g., a mass balance analysis) provides insight into the primary sources of P within an area such as a watershed. *A P mass balance for the Illinois River Watershed indicates poultry production is a substantial contributor to P within the Illinois River Watershed. Poultry production within the Illinois River Watershed is currently responsible for more than 76% of P movement into the watershed.*

...P Mass Balance Analysis for the IRW

Under my direction, M. Smith performed of an analysis that examined the flow of P into and out of the IRW system (e.g., a mass balance) (see Appendix B for full analysis). The findings include:

1. Poultry production is currently responsible for more than 76% of the net annual phosphorus additions to the IRW.
2. Historical data indicates poultry production has been the major contributor of phosphorus to the watershed since 1964. Prior to 1964, dairy cattle were responsible for the majority of the phosphorus contribution.
3. From 1949 to 2002, there was more than 219,000 tons of phosphorus added to the IRW. Almost 68% of that addition, more than 148,000 tons, was attributable to poultry production.
4. Other contributing sources of phosphorus (net additions) include commercial fertilizers (7.5%), dairy cattle (5.2%), humans (3.2%), swine (2.9%), industrial sources – mostly poultry processing facilities (2.7%) and beef cattle (1.7%). The remaining sources of phosphorus evaluated in this study, which include urban runoff, golf courses, wholesale nurseries, and recreational users, are negligible (< 1%).
5. Of the three phosphorus exports from the watershed (harvested crops, harvested deer, and water leaving Lake Tenkiller through the spillway) outflow of phosphorus through the spillway at the south end of Lake Tenkiller was the largest. According to current estimates, the flow of water through the spillway removes just under 1.25% of the total annual phosphorus additions to the watershed. The remaining two phosphorus exports combined remove just over

0.25% of current annual phosphorus additions to the watershed, totaling a 1.5% removal of current phosphorus additions.”

P Mass Balance Literature

The scientific literature describes similar approaches as that used by the mass balance analysis set forth in Appendix B. In addition, some of these studies include portions of the IRW and reached similar conclusions as those highlighted above and in Appendix B.

Slaton et al. (2004) indicate that a fundamental component of nutrient management strategies is to determine the balance between nutrient inputs and outputs to identify areas where soil nutrient inputs are greater than removals. Slaton et al. (2004) termed such areas as “critical areas” and indicated that nationally many such areas have been identified and these areas coincide with concentrated animal production. They identified critical nutrient areas within Arkansas by dividing Arkansas into 9 geographic regions and computing a nutrient mass balance for each region. Nutrient removal by crops and nutrient inputs from livestock production were computed based on Agricultural Statistics Service data. Livestock nutrient inputs to soils were computed based on livestock numbers and nutrient content of livestock waste by species. Nutrients contained in beef cattle manure were ignored by Slaton et al. (2004) as they indicate “a large proportion of these nutrients are obtained from forage and deposited directly (i.e., recycled) to pastures during grazing rather than collected in lagoons or stockpiled from confined animal production facilities.” Nutrient inputs from inorganic fertilizers were computed based on Arkansas fertilizer sales data.

Slaton et al. (2004) found that the district with the greatest excess N and P was northwest Arkansas which includes Benton and Washington counties. This region was estimated to have an accumulated P in soils for a 5 year period of 32 kg/ha. Kellogg et al. (2000) and Kellogg (2001) conducted a national nutrient balance assessment and identified the Illinois River Watershed and the northwest Arkansas and northeast Oklahoma area as being vulnerable to P loss in runoff due to excess manure based P being land applied. Sharpley et al. (2007) indicate that the spatial separation of crop and poultry production systems results in a large-scale one-way transfer of nutrients from grain to poultry producing areas. This is certainly the case for the IRW.

A similar mass balance approach was used by Mallin and Cahoon (2003) to estimate nutrients in livestock waste within North Carolina. Stow et al. (2001) also used a similar approach in computing nutrient inputs into the Neuse River Watershed in North Carolina. Cassell et al. (2002) used a mass balance and modeling approach in exploring P losses from watersheds. Sharpley et al. (2007) computed P surpluses for farms and found that poultry farms had the greatest P surpluses. Tarkalson and Mikkelsen (2003) examined P surpluses on a typical poultry farm and found that an annual surplus of 65 kg P per ha was available for

broiler farms and indicated this presents a potential hazard to surface water quality.

The accumulation of excess P in soils is problematic, since soil P levels are correlated to the amount of P in runoff (Slaton et al., 2004). One of the solutions to this problem is the transportation of manure outside the critical watersheds with substantial animal production to row-crop production areas (Slaton et al., 2004). However, they indicate that “the low economic value of poultry litter, which represents the majority of organic nutrient sources produced in Arkansas, as a fertilizer nutrient source is believed to prohibit its transport to the primary rowcrop production area.” Slaton et al. (2004) conclude that their assessment may help reinforce the thought that current nutrient application strategies in western Arkansas are not sustainable without the danger of creating and/or exacerbating water quality issues from excessive nutrients.

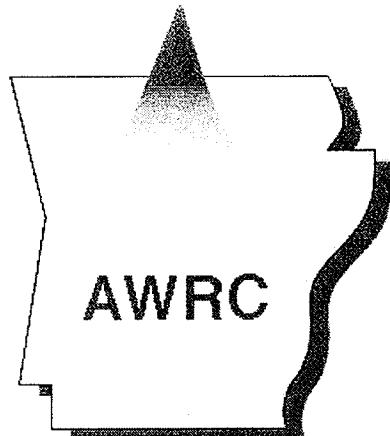
Nelson et al. (2002) performed a phosphorus mass balance for the Arkansas portion of the Illinois River Watershed. Sources of P identified in the mass balance were livestock manure, inorganic fertilizers, sludge applications and point source inputs from wastewater treatment plants. Livestock production was estimated based on agricultural statistics by county and the portion of these livestock within the watershed was allocated based on land use (pasture). A reference value of P excreted by livestock was used with the livestock production numbers to estimate total P by livestock species. Nelson et al. (2002) included dairy and beef cattle in the mass balance calculations but indicated that “beef and dairy are the only animals that obtain the majority of their phosphorus through grazing. Therefore, they are consuming plant phosphorus and depositing manure phosphorus (i.e., no net change in phosphorus in IRDA (Illinois River Drainage Area)).” A presentation to Cargill producers also acknowledges this. The annual accumulation of P in pasture soils was estimated at 8 to 9 kg P/pasture acre per year. This was largely due to the application of excess poultry litter to pastures (CARTP016287-CARTP016290).”

(Expert Report, Ex.1 at 34-5, Appendix B, Ex. 2)

I declare under penalty of perjury, under the laws of the United States of America, that the foregoing is true and correct.

Executed on the 5th day of March, 2009.

Bernard Engel, Ph.D., P.E.



Arkansas Water Resources Center

ILLINOIS RIVER PHOSPHORUS SAMPLING RESULTS AND MASS BALANCE COMPUTATION

Prepared by:

Marc Nelson, K.L. White and T. S. Soerens

MSC-336

2002

ARKANSAS WATER RESOURCES CENTER
UNIVERSITY OF ARKANSAS
112 OZARK HALL
FAYETTEVILLE, ARKANSAS 72701



Illinois River Phosphorus Sampling Results And Mass Balance Computation

M. A. Nelson, K. L. White and T. S. Soerens

ABSTRACT

Phosphorus levels in the Illinois River are of great interest to the people of the States of Arkansas and Oklahoma. A great deal of effort has been expended to ascertain and modify the phosphorus impacts on the river. An automatic water sampling station was installed on the Illinois River just upstream from the State line in 1996 to accurately quantify the phosphorus in the Arkansas portion of the watershed. This paper summarizes five years worth of phosphorus sampling results at that site. In addition, a simple mass balance for phosphorus in the Illinois River Watershed above the sampling station was developed. The mass balance consisted of determining phosphorus inputs in the drainage area and comparing these to phosphorus outputs, during the same five-year period, allowing for an estimation of phosphorus accumulation. Sampling results showed that phosphorus levels were rapidly increasing in the Illinois River at the State line. Input information showed that over 7 million pounds of phosphorus were discharged into the 575 square mile basin annually. Mass balance calculations indicated that the point source discharges were responsible for up to 43% of the phosphorus in the river. The calculations indicate that only 4% of the phosphorus applied in the watershed reached the river annually. The remaining 96% accumulated in the watershed at an average rate of 8 kg per pasture acre per year. The effect of point source reductions was investigated and resulting mean concentrations were compared to a 0.037 mg/l in-stream phosphorus limit recently adopted by the State of Oklahoma.

INTRODUCTION

The Illinois River is located in Northwest Arkansas and flows west across the AR-OK border into Oklahoma. The river crosses the state line just south of Siloam Springs at the Arkansas Highway 59 bridge. The Illinois River Drainage Area in Arkansas (IRDA) is part of the Illinois River Watershed (HUC: 11110103), and is identified in Figure 1. Based on 1999 GIS data, IRDA landuse is estimated at 58% pasture, 36% forest, and 6% urban (<http://www.cast.uark.edu/cast/geostor/>).

the following sub-basins: Muddy Fork, Osage Creek, and Spring Creek. Phosphorus loadings were determined on an annual basis.

Four point sources are located in the study area that discharge effluent directly into stream flow. Point sources discharge into the following sub-basins : Mud Creek, Muddy Fork, Osage Creek, and Spring Creek. Phosphorus loading and flow rates were obtained from each point source. Point source loadings were tabulated annually. Phosphorus loads are summarized in the Table 2.

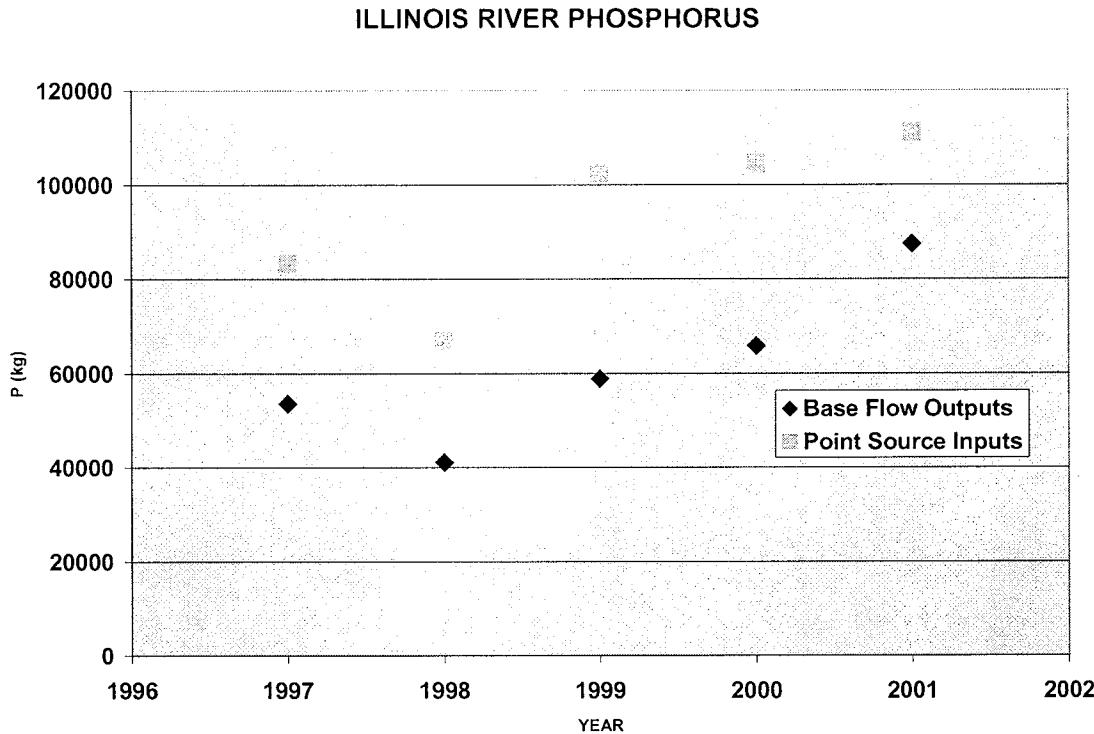
Table 2: Phosphorus outputs and inputs collected for the IRDA

	1997 (kg P)	1998 (kg P)	1999 (kg P)	2000 (kg P)	2001 (kg P)
INPUTS					
EFFLUENT					
Mud Creek	1,859	2,500	1,579	2,361	1,366
Muddy Fork	1,812	1,897	1,855	1,096	1,211
Osage Creek	20,026	8,651	18,803	9,607	7,002
Spring Creek	59,521	53,684	79,998	91,128	101,363
<i>Sum of point sources</i>	<i>83,219</i>	<i>66,732</i>	<i>102,235</i>	<i>104,192</i>	<i>110,942</i>
SLUDGE					
Mud Creek ¹	0	0	0	0	0
Muddy Fork - Blue Mtn	101	171	106	0	0
Muddy Fork - Apple Hill	0	0	455	8,452	228
Muddy Fork - Blue Mist	57	0	0	0	0
Osage Creek	26,838	34,845	31,131	32,413	34,711
Spring Creek	54,969	49,648	56,297	60,904	87,254
<i>Sum of sludge inputs/yr</i>	<i>81,965</i>	<i>84,664</i>	<i>87,990</i>	<i>101,768</i>	<i>122,193</i>
ANIMALS					
Hogs/swines	52,896	51,642	48,485	47,483	45,800
Broilers	1,370,247	1,425,057	1,512,935	1,573,453	1,669,786
Layers	211,469	221,470	231,398	244,542	247,192
Turkeys	327,307	320,448	310,556	256,015	325,896
Cattle-beef	798,483	807,058	835,421	827,756	820,545
Dairy	47,920	43,118	36,721	36,721	36,179
<i>Sum of animal inputs/yr</i>	<i>2,808,322</i>	<i>2,868,793</i>	<i>2,975,517</i>	<i>2,985,969</i>	<i>3,145,398</i>
FERTILIZER					
Fertilizer	149,966	148,623	160,506	176,066	187,212
TOTAL INPUTS	3,123,472	3,168,811	3,326,248	3,367,996	3,565,744

Mass Balance

A mass balance is a simple way to investigate a system by looking at the inputs and outputs from a system. If the element that is being considered is conservative, that is, does not leave the system except through the measured output location, the mass balance can be illustrated with the following simple formula:

Figure 3. Relationships between the base flow outputs and the point source inputs to the IRDA.



Recently the Oklahoma Water Resources Board proposed and the Oklahoma Governor approved that the Illinois River in Oklahoma be adopted as a scenic river in Oklahoma and that there be a numerical in-stream phosphorus limit of 0.037 mg/l. The U.S. Supreme Court decision of 1992 that Arkansas must adhere to Oklahoma's water standards on the Illinois may require that the IRDA phosphorus concentration be reduced to this level. Current levels of phosphorus at the state line far exceed this standard.

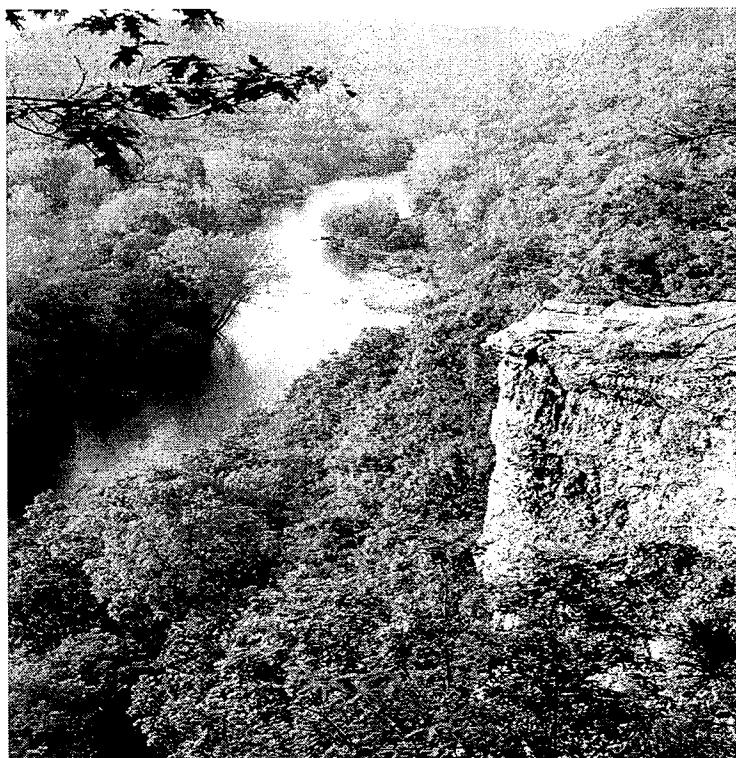
The mass balance relationship developed for current conditions was used to investigate the effect of changing the PS loading to the river. Table 5 illustrates the effect of reducing PS concentrations of the IRDA concentrations. The PS discharges have ranged from a five year average of 0.5 mg/l to 4.9 mg/l with the average value around 4 mg/l. The mass balance relationship developed was modified by reducing the point source contributions by 75 % and 100% while keeping the NPS contributions fixed. These results are not meant to represent the actual results, especially in the short term.



Prepared in cooperation with the
OKLAHOMA SCENIC RIVERS COMMISSION
OKLAHOMA WATER RESOURCES BOARD

Phosphorus Concentrations, Loads, and Yields in the Illinois River Basin, Arkansas and Oklahoma, 1997-2001

Water-Resources Investigations Report 03-4168



Photograph by Edward H. Fite, III, Oklahoma Scenic Rivers Commission

U.S. Department of the Interior
U.S. Geological Survey



**U.S. Department of the Interior
U.S. Geological Survey**

Phosphorus Concentrations, Loads, and Yields in the Illinois River Basin, Arkansas and Oklahoma, 1997-2001

By Barbara E. Pickup¹, William J. Andrews¹, Brian E. Haggard², and W. Reed Green¹

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Abstract

The Illinois River and tributaries, Flint Creek and the Baron Fork, are designated scenic rivers in Oklahoma. Recent phosphorus increases in streams in the basin have resulted in the growth of excess algae, which have limited the aesthetic benefits of water bodies in the basin, especially the Illinois River and Lake Tenkiller. The Oklahoma Water Resources Board has established a standard for total phosphorus not to exceed the 30-day geometric mean concentration of 0.037 milligram per liter in Oklahoma Scenic Rivers. Data from water-quality samples from 1997 to 2001 were used to summarize phosphorus concentrations and estimate phosphorus loads, yields, and flow-weighted concentrations in the Illinois River basin.

Phosphorus concentrations in the Illinois River basin generally were significantly greater in runoff-event samples than in base-flow samples. Phosphorus concentrations generally decreased with increasing base flow, from dilution, and increased with runoff, possibly because of phosphorus resuspension, stream bank erosion, and the addition of phosphorus from nonpoint sources.

Estimated mean annual phosphorus loads were greater at the Illinois River stations than at Flint Creek and the Baron Fork. Loads appeared to generally increase with time during 1997-2001 at all stations, but this increase might be partly attributable to the beginning of runoff-event sampling in the basin in July 1999. Base-flow loads at stations on the Illinois River were about 10 times greater than those on the Baron Fork and 5 times greater than those on Flint Creek. Runoff components of the annual total phosphorus load ranged from 58.7 to 96.8 percent from 1997-2001. Base-flow and runoff loads were generally greatest in spring (March through May) or summer (June through August), and were least in fall (September through November).

Total yields of phosphorus ranged from 107 to 797 pounds per year per square mile. Greatest yields were at Flint Creek near Kansas (365 to 797 pounds per year per square mile) and the least yields were at Baron Fork at Eldon (107 to 440 pounds per year per square mile).

Estimated mean flow-weighted concentrations were more than 10 times greater than the median and were consistently

greater than the 75th percentile of flow-weighted phosphorus concentrations in samples collected at relatively undeveloped basins of the United States (0.022 milligram per liter and 0.037 milligram per liter, respectively). In addition, flow-weighted phosphorus concentrations in 1999-2001 at all Illinois River stations and at Flint Creek near Kansas were equal to or greater than the 75th percentile of all National Water-Quality Assessment program stations in the United States (0.29 milligram per liter).

The annual average phosphorus load entering Lake Tenkiller was about 577,000 pounds per year, and more than 86 percent of the load was transported to the lake by runoff.

Introduction

The Oklahoma Scenic Rivers Act of 1969 designated the Illinois River in northeastern Oklahoma (fig. 1) a 'Scenic River' to protect water quality and preserve fish, wildlife, and outdoor recreational values for the benefit of the people of Oklahoma and visitors to the state. The Oklahoma Scenic Rivers Commission (OSRC) was created in 1977 to enforce the stipulations of this Act. A 1981 supplement to the Oklahoma Scenic Rivers Act designated Flint Creek and Baron Fork, two Illinois River tributaries, as scenic rivers (Oklahoma Statutes, Title O.S. Supp. 1981, Sec. 1451).

Streams in the Illinois River basin are used for primary body contact recreation (in which there is a possibility of human ingestion of water) and fisheries. Water from these streams also is used for public and private water supply and non-irrigation agriculture (Oklahoma Water Resources Board, 2000). About 350,000 tourists spend an estimated \$9 million per year in the basin (Linda Loucks, Oklahoma Water Resources Board, written commun., 2001). The Illinois River flows into Tenkiller Ferry Lake (referred to as Lake Tenkiller). An estimated \$16.5 million is generated annually by about 1,500,000 visitors per year to the area around this lake (John Marnell, U.S. Army Corps of Engineers, written commun., 2001).

Phosphorus can enter streams in discharges from wastewater-treatment plants (point-source components) and in agricultural and urban runoff (nonpoint-source components) (Oklahoma

20 Phosphorus Concentrations, Loads, and Yields in the Illinois River Basin, Arkansas and Oklahoma, 1997-2001

Table 8. Mean annual phosphorus loads, mean annual streamflows, and mean flow-weighted phosphorus concentrations for water-quality stations in the Illinois River basin, Oklahoma, periods 1997-1999, 1998-2000, and 1999-2001

[lb/yr, pounds per year; ft³/s, cubic foot per second; mg/L, milligram per liter]

Station name (number)	3-year period	Mean annual phosphorus load (lb/yr)	Mean annual streamflow for years of study (ft ³ /s)	Mean flow-weighted phosphorus concentration (mg/L)
Illinois River near Watts (07195500)	1997-1999	164,000	692	0.120
	1998-2000	329,000	718	0.233
	1999-2001	438,000	696	0.320
Flint Creek near Kansas (07196000)	1997-1999	40,200	110	0.186
	1998-2000	80,400	122	0.335
	1999-2001	87,700	123	0.362
Illinois River at Chewey (07196090)	1997-1999	292,000	802	0.185
	1998-2000	438,000	840	0.265
	1999-2001	548,000	819	0.339
Illinois River near Tahlequah (07196500)	1997-1999	307,000	1,000	0.156
	1998-2000	511,000	1,090	0.238
	1999-2001	621,000	1,090	0.289
Baron Fork at Eldon (07197000)	1997-1999	32,800	369	0.045
	1998-2000	124,000	382	0.165
	1999-2001	135,000	360	0.190

22 Phosphorus Concentrations, Loads, and Yields in the Illinois River Basin, Arkansas and Oklahoma, 1997-2001

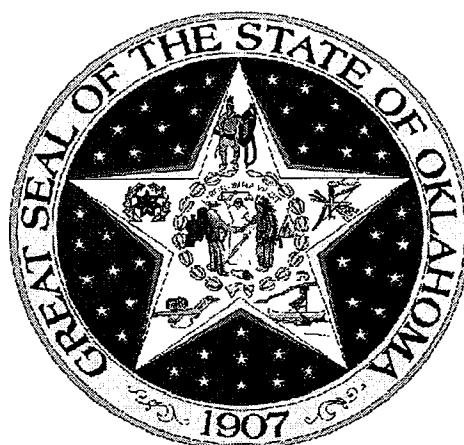
Table 3. Summary of phosphorus loads to Lake Texoma, Oklahoma, periods 1997-1999, 1998-2000, and 1999-2001

[lb/yr, pounds per year. Mean and standard deviation of the total load are calculated by LOADEST2 and are statistics of all data in the 3-year period. Means of base-flow loads are calculated from base-flow data only; means of runoff loads are calculated from runoff data only. Differences between total load and the sum of base-flow plus runoff loads are due to rounding within LOADEST2.]

Flow type	3-year period	Total mean annual phosphorus load ¹ per period (lb/yr)	Average total mean annual phosphorus load ¹ , 1997-2001 (lb/yr)	Illinois River near Tahlequah component per period (percent)	Average Illinois River near Tahlequah component, 1997-2001 (percent)	Baron Fork at Eldon component per period (percent)	Average Baron Fork at Eldon component, 1997-2001 (percent)
Base flow	1997-1999	73,400	73,300	93.7	93.0	6.22	7.03
	1998-2000	71,900		93.2		6.84	
	1999-2001	74,600		92.0		8.02	
Runoff	1997-1999	266,000	501,000	89.5	83.1	10.7	17.0
	1998-2000	566,000		78.8		21.2	
	1999-2001	671,000		80.9		19.1	
Total	1997-1999	340,000	577,000	90.3	84.0	9.68	15.7
	1998-2000	635,000		80.8		19.7	
	1999-2001	756,000		81.0		17.7	

¹Loads are calculated by adding loads from Illinois River near Tahlequah to loads from Baron Fork at Eldon (table 5).

THE STATE OF OKLAHOMA
2004
WATER QUALITY ASSESSMENT
INTEGRATED REPORT



PREPARED PURSUANT TO SECTION 303(d) AND SECTION 305(b)
OF THE CLEAN WATER ACT

Prepared by
OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

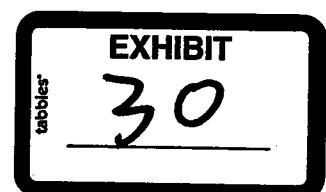


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Appendix C

303(d) List Legend

Legend for Attainment	
Code	Description
F	Fully Supporting
N	Not Supporting
I	Insufficient Information
X	Not Assessed

USE ID	Description
124	Aesthetic
125	Agriculture
129	Emergency Water Supply
130	Cool Water Aquatic Community
131	Habitat Limited Aquatic Community
132	Trout Fishery
133	Warm Water Aquatic Community
134	Hydropower
135	Industrial and Municipal Process and Cooling Water
136	Navigation
137	Primary Body Contact Recreation
138	Public and Private Water Supply
139	Secondary Body Contact Recreation
1003	Fish Consumption
1004	Outstanding Resource
1005	Sensitive Water Supply
1006	High Quality Water

2004 Integrated Report
Appendix C
Category 5 303(d) List

Legend for Impairment	
Impairment ID	Description
91	Ammonia (Unionized) - Toxin
96	Arsenic
104	Barium
127	Cadmium
138	Chloride
153	Chlorpyrifos
154	Chromium (total)
163	Copper
187	Diazinon
198	Dieldrin
215	Enterococcus
217	Escherichia coli
230	Fishes Bioassessments (Streams)
267	Lead
302	Nitrates
317	Oil and Grease
322	Oxygen, Dissolved
372	Selenium
375	Silver
385	Sulfates
398	Total Coliform
399	Total Dissolved Solids
400	Total Fecal Coliform
413	Turbidity
423	Zinc
441	pH
462	Total Phosphorus

Legend for Sources	
Source ID	Description
2	Acid Mine Drainage
33	Discharges from Biosolids (SLUDGE) Storage, Application or Disposal
62	Industrial Point Source Discharge
68	Land Application of Wastewater Biosolids (Non-agricultural)
70	Leaking Underground Storage Tanks
82	Mine Tailings
84	Municipal (Urbanized High Density Area)
85	Municipal Point Source Discharges
92	On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
100	Runoff from Permitted Confined Animal Feeding Operations (CAFOs)
102	Petroleum/natural Gas Activities (Legacy)
119	Silviculture Harvesting
124	Spills from Trucks or Trains
127	Surface Mining
140	Source Unknown
155	Natural Sources
156	Agriculture
157	Habitat Modification - other than Hydromodification

Category 5
303(d) List

OKWID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK120400010260_00	Arkansas River	15 MILES	I124, F125, N133, F135, N137, I1003	127, 267	140	84, 140, 85, 92, 156
OK120400020030_00	Dirty Creek, South Fork	16 MILES	N124, F125, N133, X135, I137, X1003	317, 322		
OK120400020190_00	Elk Creek	16 MILES	I124, X125, I133, X135, N137, X1003	400	140	
OK120410010080_00	Arkansas River	29 MILES	I124, N125, F129, N133, F134, I135, F136, N137, N139, I1003	399, 413, 215	140	
OK120410010190_00	Bixhoma Lake	110 ACRES	F124, I125, N133, I135, I137, X1003	322	140	
OK120410010210_00	Hailey Creek	11 MILES	I124, I125, N133, X135, N137, X1003	187, 217	140, 84	
OK120420010010_00	Arkansas River	19 MILES	I124, F125, F129, I133, F134, F135, F136, N137, X139, I1003	215, 217, 400	140	
OK120420010060_00	Fred Creek	3 MILES	I124, I125, I133, X135, N137, X1003	217	84, 140	
OK120420010070_00	Mosser Creek	4 MILES	I133, X135, N137, X1003, I124, I125	217	84, 140	
OK120420010090_00	Crow Creek	3 MILES	I124, I125, N133, X135, N137, X1003	322, 217	84, 140	
OK120420020010_00	Polecat Creek	7 MILES	F124, F125, F133, F135, N137, X1003	217	84, 85, 140	
OK120420020040_00	Nickel Creek	12 MILES	X124, X125, I133, X135, N137, X1003	217	84, 85, 140	
OK120420020160_00	Childres Creek	7 MILES	I124, N125, X131, I135, X139, X1003	138, 399	102	
OK121300010010_00	Bird Creek	24 MILES	I124, F125, N133, F135, N137, F138, I1003	413, 215, 400	140	

OKW/BID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK121300010060_00	Ranch Creek	7MILES	I124, F125, I133, X135, N137, X1003	217	84, 140	
OK121300010150_00	Delaware Creek	27MILES	I124, N125, N133, X135, N137, I138, X1003	138, 399, 322, 441, 215, 217	102, 140, 68, 92	
OK121300020010_00	Bird Creek	40MILES	F124, F125, I133, X135, N137, F138, I1003	215, 217	85, 92, 140, 156	
OK121300030080_00	Candy Creek	17MILES	F124, F125, I133, F135, N137, N138, X1003	400, 398	N/A	
OK121300030010_00	Bird Creek	25MILES	F124, F125, I133, F135, N137, N138, X1003	400, 398	N/A	
OK121300030040_00	Birch Lake	1,137ACRES	F124, I125, N133, I135, I137, I138, X1005	322	140	
OK121300030200_00	Clear Creek	20MILES	F124, F125, I133, F135, N137, X1003	400	92, 140, 156	
OK121300030230_00	Pawhuska Lake	96ACRES	F124, I125, N133, I135, I137, X1003	322	140	
OK121300030300_00	Bluestem Lake	762ACRES	F124, I125, N133, I135, I137, I138, X1003	322, 413	140	
OK121300030320_00	Bird Creek, North	20MILES	F124, F125, I133, F135, N137, X1003	400	N/A	
OK121300040010_00	Hominy Creek	13MILES	F124, F125, N133, X135, N137, I138, X1003	441, 215	140, 85, 92	
OK121300040080_00	Skiatook Lake	10,190ACRES	I137, I138, X1003, X1005, I135, F124, I125, N133	322	140	
OK121300040330_00	Hominy Creek	34MILES	I133, X135, N137, N138, X1003, X1005, F124, I125, N125	138, 399, 215, 400, 398	N/A	
OK121300040330_00	Hominy Municipal Lake	165ACRES	F124, I125, N133, I135, I137, I138, X1003	322	140	
OK121400010010_00	Caney River	16MILES	I124, F125, N133, F135, N137, I138, I1003	267, 413, 215	140	
OK121400010010_10	Caney River	46MILES	I124, F125, N133, F135, N137, I138, I1003	267, 413	140	

OKWID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK121400010090_00	Rabb Creek	6MILES	I124, F125, F133, I135, N137, X1003	400		N/A
OK121400010270_00	Curl Creek	17MILES	F124, F125, N133, X135, N137, X1003	322, 413, 215, 217	92,	140, 156
OK121400010300_00	Hogshooter Creek	20MILES	F124, F125, N133, F135, N137, X1003	322, 215, 217, 400	92,	140, 156
OK121400020090_00	Hudson Lake	250ACRES	F124, I125, N133, I135, I137, X1003	322		140
OK121400020140_00	Little Caney River (Caney Creek)	6MILES	F124, F125, N133, X135, N137, I138, X1005	413, 441, 215	140, 156, 85, 92	
OK121400020190_00	Mission Creek	18MILES	I124, F125, N133, F135, N137, X1003	322, 215, 217	92,	140, 156, 84, 85
OK121400030170_00	Buck Creek	25MILES	F124, F125, I133, F135, N137, I138, X1003	215, 217	92,	140, 156
OK121400040010_00	Sand Creek	60MILES	I124, F125, I133, F135, N137, N138, X1003	215, 217, 400, 398	92,	140, 156
OK121500010200_00	Verdigris River	6MILES	I124, F125, N133, F134, F135, N137, F138, I1003	267, 413, 215	140	
OK121500020090_00	Bull Creek	19MILES	X1003, F124, N125, N133, X135, N137	385, 91, 322, 413, 215, 217, 400	92,	140, 156
OK121500020100_00	Pea Creek	10MILES	I124, X125, I133, X135, N137, X1003	215, 217, 400	140	
OK121500020150_00	Adams Creek	20MILES	I124, I125, N133, X135, N137, X138, X1003	187, 217	140, 84, 92, 156	
OK121500020260_00	Verdigris River	18MILES	I124, F125, N133, F134, F135, F137, I138, I1003	267	140	
OK121500020360_00	Dog Creek	10MILES	I124, F125, N133, F135, N137, F138, X1003	91, 322, 215, 217, 400	84, 85, 92, 140, 156	
OK121500020390_00	Cat Creek	7MILES	I124, N125, F129, N133, X135, N137, X1003	385, 230, 322, 215, 217, 400	140, 84, 85	
OK121500030010_00	Verdigris River	16MILES	I124, F125, N133, F134, F135, N137, I138, I1003	267, 215	140	

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK121500040010_00	Dog Creek	20MILES	X1003	I124, I125, N133, X135, I137, I138,	322	84, 92, 140, 156
OK121510010020_00	Oologah Lake	29,460ACRES	I137, I138, X1003	F124, I125, N133, F134, I135, F136,	413	140
OK121510010040_00	Spencer Creek	10MILES	X1003, X1005	F124, N125, F133, I135, X137, F138,	385, 399	N/A
OK121510010120_00	Plumb Creek	8MILES	X1003	F124, N125, F133, I135, X137, F138,	385, 399	140
OK121510010130_00	Lightning Creek	17MILES	X1003	F124, N125, I133, I135, N137, F138,	385, 399, 217	82, 127, 140, 92, 156
OK121510010140_00	Panther Creek	8MILES	X1003	F124, N125, F133, I135, X137, F138,	385, 399	82, 140
OK121510020010_00	Verdigris River	37MILES	N137, I138, X1003	I124, F125, N133, F134, F135, F136,	267, 413, 215	140
OK121510020050_00	California Creek	25MILES	X1003	F125, N133, I135, N137, F138, F124,	322, 413, 215	92, 140, 156
OK121510020250_00	Snow Creek	7MILES	X1003	I124, F125, F133, I135, I137, N138,	398	92, 140, 156
OK121510030010_00	Big Creek	34MILES	X1003	I124, F125, F133, F135, N137, N138,	215, 217, 398	92, 140, 156
OK121600010010_00	Neosho River	7MILES	I124, X125, N133, X135, N137, I1003	423, 215	140	
OK121600010050_00	Fort Gibson Lake	9,950ACRES	X1003	I124, I125, N133, F134, I135, I137, I138,	413	140
OK121600010060_00	Ranger Creek	11MILES	I124, F125, F133, F135, N137, X1003	215, 217	92, 140, 156	
OK121600010100_00	Fourteenmile Creek	26MILES	X1003, X1006	I124, F125, F130, F135, N137, I138,	215, 217	92, 140, 156
OK121600010430_00	Chouteau Creek	22MILES	X1003	F124, N125, N133, F135, N137, N138,	399, 322, 413, 215, 217, 400, 398	140, 92, 156
OK121600010440_00	Crutchfield Branch	5MILES	I124, X125, I133, X135, N137, X1003	215, 217, 400	140	

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK121600020030_00	Saline Creek	32MILES	X1003	I124, F125, F130, F135, N137, I138,	215	85, 100, 140, 156
OK121600020050_00	Chimney Rock Lake	1ACRES	F124, I125, N133, I135, I137, X1003	322	140	
OK121600020070_00	Little Saline Creek	11MILES	X1003	F124, F125, I130, F135, N137, F138,	215, 217	140, 156
OK121600020170_00	Neosho River	15MILES	I1003	I124, F125, N133, F135, F137, I138,	322	140
OK121600030020_00	Lake O' the Cherokees	5,813ACRES	X1003	I124, I125, N133, F134, I135, I137, I138,	322	140
OK121600030090_00	Drowning Creek	14MILES	X1003	I124, N125, F130, X135, N137, I138,	138, 399, 215, 217	N/A
OK121600030160_00	Horse Creek	19MILES	X1003	I124, N125, F129, N133, X135, N137,	138, 91, 322, 441, 217,	140, 85, 92, 156
OK121600030180_00	Fly Creek	4MILES	F124, F125, I133, F135, N137, X1003	400		92, 140
OK121600030190_00	Little Horse Creek	6MILES	I124, N125, N133, F135, N137, X1003	399, 322, 215, 217, 400	140, 156	
OK121600030340_00	Cave Springs Branch	13MILES	X1003, X1006	I124, N125, I130, X135, N137, I138,	138, 385, 399, 217, 400	140
OK121600030440_00	Elk River	13MILES	I1003	I124, F125, I130, F135, N137, I138,	215	140
OK121600030445_00	Honey Creek	5MILES	I1003	I124, F125, I130, F135, N137, I138,	215	140
OK121600030445_10	Honey Creek	5MILES	I1003	I124, F125, I130, F135, N137, I138,	215	N/A
OK121600030510_00	Sycamore Creek	9MILES	X1003	I124, F125, F130, F135, N137, I138,	215, 217	92, 140, 156
OK121600030560_00	Lost Creek	10MILES	N137	I138, X1003, F124, F125, F130, F135,	217	140
OK121600040040_00	Hudson Creek	8MILES	F124, F125, N133, F135, I137, X1003	322, 413	92, 140, 156	

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK121600040060_00	Tar Creek	12	MILES	F131, N139, X1003	215	N/A
OK121600040130_00	Cow Creek	12	MILES	F124, F125, N133, F135, N137, X1003	322, 413, 400	92, 140, 156
OK121600040170_00	Fourmile Creek	7	MILES	I124, F125, N133, F135, N137, X1003	322, 400	92, 140, 156
OK121600040200_00	Russell Creek	11	MILES	F124, N125, N133, X135, N137, X1003	385, 322, 400	140, 92, 156
OK121600050020_00	Spavinaw Lake	1,584	ACRES	N124, I125, N133, I137, I138, X1003, X1005	462, 322	85, 156, 140
OK121600050070_00	Eucha Lake (Upper Spavinaw)	2,860	ACRES	N124, I125, N133, I137, I138, X1003, X1005	462, 322	85, 156, 140
OK121600050160_00	Beaty Creek	13	MILES	I124, F125, F130, N137, I138, X1003, X1005	215, 217	92, 140, 156
OK121600060010_00	Big Cabin Creek	6	MILES	I124, F125, N133, F135, I137, I138, I1003	413	140
OK121600060080_00	Little Cabin Creek	33	MILES	F124, N125, N133, X135, N137, X1003	385, 399, 322, 215, 217	140, 85, 92, 156
OK121600060200_00	Bull Creek	11	MILES	F124, N125, N133, X135, N137, X1003	138, 385, 322, 217, 400	92, 140, 84, 85,
OK121600060220_00	Big Cabin Creek	12	MILES	I124, N125, N133, X135, I139, X1003	138, 385, 399, 441	140
OK121600060240_00	Pawpaw Creek	18	MILES	F124, N125, N133, X135, N137, X1003	385, 322, 217, 400	140, 92, 156
OK121600070010_00	Spring River	22	MILES	I124, F125, N130, F135, N137, I138, I1003	267, 413, 423, 215	140
OK121610000050_00	Pryor Creek	4	MILES	F124, N125, N133, X135, N137, I138, X1003	138, 322, 441, 215, 217	92, 156
OK121610000090_00	Pryor Creek	2	MILES	F124, F125, N133, F135, N137, N138, X1003	322, 413, 217, 398	84, 85, 92, 140, 156
OK121700020020_00	Tenkiller Ferry Lake	6,450	ACRES	I138, X1003	462, 322	140

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK121700020110_00	Chicken Creek	5MILES	I124, I125, N133, X135, X137, X1003	230		140
OK121700030010_00	Illinois River	8MILES	N124, F125, N130, F135, N137, N138, I1003	462, 413, 215, 217, 400	140	
OK121700030040_00	Tahlequah Creek (Town Branch)	6MILES	X124, X125, X130, N137, X138, X1003, X1004	217		N/A
OK121700030280_00	Illinois River	15MILES	N124, F125, X133, F135, X137, X1003	462		140
OK121700030350_00	Illinois River	5MILES	N137, N138, I1003, X1004, N124, F125, N130, F135	462, 413, 215, 217, 400	140	
OK121700040010_00	Caney Creek	2MILES	F124, F125, F130, F135, N137, F138, I1003	215		N/A
OK121700050010_00	Illinois River, Baron Fork	23MILES	N124, F125, I130, F135, N137, N138, I1003, X1004	215, 217, 400		N/A
OK121700060010_00	Flint Creek	7MILES	N124, F125, F130, F135, N137, N138, I1003	462, 215, 217, 400	140	
OK121700060080_00	Flint Creek	5MILES	I124, F125, F130, F135, N137, N138, I1003, X1004	215, 302		140
OK121700060090_00	Sager Creek	1MILES	I124, F125, I130, F135, N137, N138, X1003	302		140
OK220100010010_00	Poteau River	21MILES	I124, F125, N133, F135, F137, I138, I1003	163, 267, 413		140
OK220100010010_30	Poteau River	2MILES	X124, X125, N133, X135, X137, X138, X1003	127, 163, 267, 372, 375		140
OK220100010010_40	Poteau River	21MILES	I124, F125, N133, F135, F137, I138, I1003	163, 267, 413		140
OK220100010050_00	New Spiro Lake	254ACRES	F124, I125, N133, I135, I137, I138, X1003	322		140
OK220100020020_00	Wister Lake	7,333ACRES	N124, X125, X133, X135, X137, X138, X1003	462		140
OK220100020040_00	Poteau River, Black Fork	30MILES	I124, F125, N130, F135, I137, I138, X1003, X1006	441		140

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK220100020060_00	Cedar Lake	78 ACRES	F124, I125, N133, I135, I137, X1003	322, 441	140	
OK220100030010_00	Brazil Creek	18 MILES	X1003 F124, N125, N133, X135, N137, F138,	385, 322, 217	140, 92, 156	
OK220100040020_00	Fourche Maline Creek	37 MILES	I124, F125, N133, F135, N135, I138, I1003	267, 322, 215	140	
OK220100040050_00	Red Oak Creek	11 MILES	F124, N125, N133, I135, X137, X1003	385, 441	140	
OK220100040100_00	Lloyd Church Lake (Wilburton City)	160 ACRES	F124, I125, N133, I135, I137, X1003	322, 413, 441	140	
OK220100040150_00	Wayne Wallace Lake	94 ACRES	F124, I125, N133, I135, I137, X1003	322	140	
OK220200010010_00	Arkansas River	21 MILES	I124, F125, F129, N133, F134, F135, F136, F137, X138, I1003	413	140	
OK220200020020_00	Robert S. Kerr Lake	43,800 ACRES	F124, I125, N133, F134, I135, F136, I137, I138, X1003	413	140	
OK220200030040_00	Brushy Creek Lake	358 ACRES	F124, I125, N133, I135, I137, I138, X1003	322, 441	140	
OK220200030120_00	Stillwell City Lake	188 ACRES	F124, I125, N133, I135, I137, X1003	322	140	
OK220200040010_00	Sans Bois Creek	9 MILES	X1003 F124, F125, N133, I135, N137, F138,	322, 441, 215, 217	85, 92, 140, 156	
OK220200040110_40	Sans Bois Creek	28 MILES	X1003 I124, F125, N133, I135, N137, I138,	322, 413	140	
OK220200040030_00	John Wells Lake (Stigler)	194 ACRES	X1003, X1005 F124, I125, N133, I135, I137, I138,	322	140	
OK220200040050_00	Sans Bois Creek, Mountain Fork	19 MILES	F124, F125, N133, F135, N137, X1003 N124, F125, N130, F135, I137, X138,	441, 217	140, 92, 156	
OK220200050010_10	Lee Creek	16 MILES	X1003, X1004 F124, F125, N133, F135, N137, F138,	462, 322	140	
OK220600010070_00	Longtown Creek	26 MILES	X1003 322, 215, 217, 400	322, 215, 217, 400	92, 140, 156	

OKWBID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK220600010100_00	Mill Creek	6 MILES	X1003	F124, F125, N133, X135, N137, F138,	413, 441, 217, 400	140, 156, 92
OK220600010100_20	Mill Creek	24 MILES	X1003	F124, F125, N133, F135, N137, F138,	322, 413, 441	140
OK220600010119_00	Canadian River	17 MILES	I1003	I124, N125, N133, I135, N135, N137, I138,	385, 399, 413, 215	140
OK220600010119_10	Canadian River	39 MILES	I1003	I124, N125, N133, I135, F137, I138,	385, 399, 413	140
OK220600010170_00	Big Creek	11 MILES	X1003	I124, N125, I133, I135, X137, I138,	138, 399	140
OK220600020030_00	McAlester Lake	1,521 ACRES	I125, N133	I135, I137, I138, X1003, X1005, F124,	441	140
OK220600020050_00	Talawanda 2 Lake	195 ACRES	F124, I125, N133, I135, I137, X1003	322, 441	140	
OK220600020060_00	Talawanda 1 Lake	91 ACRES	F124, I125, N133, I135, I137, X1003	322, 441	140	
OK220600030010_00	Brushy Creek	6 MILES	I1003	N124, F125, N133, F135, N137, N138,	215, 400	92, 140, 102, 156
OK220600030010_10	Brushy Creek	25 MILES	I1003	I124, F125, N133, F135, N137, I138,	322, 413, 441	140
OK220600030020_00	Blue Creek	14 MILES	X1003	I124, X125, I133, X135, N135, N137, X138,	215, 217, 400	140
OK220600030050_00	Peaceable Creek	17 MILES	I1003	F124, F125, N133, F135, N137, N138,	413, 400, 398	140, 156, 85, 92
OK220600030080_00	Bull Creek	2 MILES	X124, X125, N133, X135, X137, I1003	163, 267, 423	62	
OK220600040010_00	Gaines Creek	39 MILES	X1003	N124, F125, N133, F135, I137, N138,	317, 322, 441	102, 140, 92, 156
OK220600040030_00	Beaver Creek	12 MILES	N124, F125, N133, F135, N137, X1003	317, 322, 413, 217, 400	102, 140, 92, 156	
OK220600040040_00	Pit Creek	8 MILES	F124, I125, N133, X135, X137, X1003	385, 399, 322, 441	2, 140, 156	

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK310800010050_00	River Arm, Upper Texoma Lake, Washita	17,600 ACRES	X1003	I124, I125, N133, F134, I135, I137, I138,	322	140
OK310800010051_00	Old Channel (of Washita)	6 MILES	X1003	F124, N125, I133, I135, X137, F138,	138	102
OK310800010120_00	Pennington Creek	34 MILES	X138, X1003, X1006	I124, X125, X130, I133, X135, N137,	215	140
OK310800010240_00	Oil Creek	19 MILES	X1003	F124, F125, I133, F135, N137, N138,	400, 398	92, 100, 140, 156
OK310800020010_00	Washita River	32 MILES	N1003	I124, F125, N133, F135, N137, I138,	413, 215, 400, 267	140
OK310800020040_00	Sand Branch	6 MILES	F124, F125, N133, F135, N137, X1003	413, 400	140, 156, 68, 92	
OK310800020190_00	Chigley Sandy Creek	14 MILES	X1003	F124, F125, I133, F135, N137, F138,	400	92, 140, 156
OK310800030010_06	Caddo Creek	10 MILES	X1003	I124, N125, I133, I135, X137, I138,	138, 399	102
OK310800030070_00	Ardmore City Lake (City)	142 ACRES	F124, I125, N133, I135, I137, X1003	322	140	
OK310800030120_00	Site # 18 Lake	248 ACRES	X1003, X1005	F124, I125, N133, I135, I137, X138,	322, 413, 441	140
OK310800030140_00	Jean Neustadt Lake	462 ACRES	F124, I125, N133, I135, I137, X1003	322, 441	140	
OK310800030265_00	Briar Branch	4 MILES	X1003	I124, N125, I133, I135, X137, I138,	138, 399	102
OK310800030280_00	Pruitt Branch	5 MILES	X1003	F124, N125, I133, I135, X137, F138,	138, 399	102
OK310800030290_00	Russell Pretty Branch, Trib A	1 MILES	I124, N125, I133, I135, X137, X1003	138, 399	102	
OK310810010010_00	Washita River	21 MILES	I1003	I124, N125, N133, X135, N137, I138,	399, 413, 215, 400	140
OK310810010010_10	Washita River	33 MILES	I1003	I124, N125, N133, X135, N137, I138,	399, 413	140

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Appendix C
Category 5 3b3(c) Lst

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK310810010090_00	Rush Creek	4 MILES	F124, N125, I131, I135, X139, X1003	138, 399	102	
OK310810010090_10	Rush Creek	5 MILES	F124, N125, I133, I135, X137, X1003	138, 399	102	
OK310810010186_00	RC Longmire Lake	745 ACRES	F124, N125, N133, I135, I137, X1003	322	140	
OK310810020010_00	Washita River	55 MILES	I124, N125, I133, I135, X137, F138, X1003	399	140	
OK310810020170_00	Roaring Creek	18 MILES	F124, F125, I133, F135, N137, F138, X1003	215, 217, 400	N/A	
OK310810020200_00	Lafin Creek	13 MILES	F124, F125, I133, I135, X137, I138, X1003	215, 217, 400	92, 140, 156	
OK310810020260_00	Stealy Creek!	2 MILES	F124, N125, F133, I135, X137, I138, X1003	138, 399	70	
OK310810030010_00	Wildhorse Creek	22 MILES	F124, N125, I133, I135, X137, I138, X1003	138, 399	102	
OK310810030130_00	Countyline Creek	4 MILES	I124, N125, I133, I135, X137, X1003	138, 399	102	
OK310810030135_00	Pernell School Creek!	2 MILES	I124, N125, I133, I135, X137, I138, X1003	385, 399	102	
OK310810030140_00	unn Pernell Creek, North	4 MILES	I124, N125, I133, I135, X137, I138, X1003	138, 399	102	
OK310810030145_00	Pernell Creek!	2 MILES	I124, N125, I133, I135, X137, I138, X1003	138, 399	102	
OK310810040010_00	Wildhorse Creek	24 MILES	F124, N125, I133, I135, X137, F138, X1003	399	102	
OK310810040015_00	West County Line Creek	3 MILES	F124, N125, I133, I135, X137, F138, X1003	138	102	
OK310810040030_00	Black Bear Creek	13 MILES	F124, N125, I133, I135, X137, F138, X1003	399	140	
OK310810040050_00	Fuqua Lake	1,500 ACRES	F124, I125, N133, I135, I137, I138, X1003	413	140	

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK310810040140_00	Wildhorse Creek	13 MILES	X1003	F124, N125, I133, I135, X137, F138,	385, 399	140
OK310810050010_00	Rush Creek	58 MILES	X1003	F124, N125, I133, I135, I137, I138,	138	102
OK310810050040_00	Murray Creek	7 MILES	X1003	I124, N125, I133, I135, X137, I138,	385, 399	140
OK310810050110_00	Rush Creek, Trib D!	1 MILES	I124, N125, I133, I135, X137, X1003	138		102
OK310820010010_00	Washita River	51 MILES	N1003	I124, I125, I133, X135, X137, I138,	267	140
OK310820010030_00	Bitter Creek	6 MILES	X1003	F124, F125, I133, X135, N137, I138,	215, 217, 400	N/A
OK310820010170_00	Jack Hollow Creek	5 MILES	X1003	I124, N125, I133, N135, X137, I138,	385, 399	140
OK310820010230_00 A!	Jack Hollow Creek, Trib	3 MILES	I124, N125, I133, I135, X137, X1003	385, 399		140
OK310820020010_00	Little Washita River	37 MILES	X1003	F124, F125, I133, F135, N137, F138,	215, 400	92, 140, 156
OK310820020090_00	Little Rush Creek	5 MILES	X1003	F124, N125, F133, I135, X137, I138,	385, 399	N/A
OK310820020110_00	McCarthy Creek	8 MILES	F133	X137, I138, X1003, I135, F124, N125,	138, 399	102
OK310820020140_00	Allen's Lake	10 ACRES	X124, N125, X133, I135, X137, X1003	138, 399		102
OK310830010010_00	Washita River	30 MILES	I1003	I124, F125, N133, F135, N137, F138,	413, 215	140
OK310830010030_00	Delaware Creek	12 MILES	I124, N125, I133, I135, X137, X1003	138, 399		102
OK310830030010_00	Washita River	52 MILES	I1003	I124, F125, N133, F135, N137, I138,	413, 215, 217, 400	140, 156
OK310830030010_10	Washita River	30 MILES	I1003	F124, F125, N133, F135, N137, I138,	413	140

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK310830030190_00	Beaver Creek	23MILES	F124, N125, I133, X135, I139, X1003	385	140	
OK310830030230_00	Barnitz Creek, West	39MILES	F124, N125, I133, X135, N137, F138, X1003	385, 215	N/A	
OK310830060020_00	Fort Cobb Lake	4,100ACRES	N124, I125, I133, I135, I137, I138, X1003, X1005	462	140	
OK310830060030_00	Willow Creek	11MILES	F124, F125, I133, F135, N137, F138, X1003, X1005	215, 217, 400	92, 140, 156	
OK310830060040_00	Lake Creek	16MILES	F124, F125, I133, F135, X137, N138, X1003	372	140	
OK310840010010_00	Washita River	34MILES	I124, F125, N133, F135, N137, I138, I1003	413, 215, 400	140	
OK310840010060_00	Quatermaster Creek	33MILES	F124, N125, I133, X135, N137, F138, X1003	385, 215, 217, 400	N/A	
OK310840020010_00	Washita River	66MILES	F124, F125, N133, F135, I137, I138, X1003	413	140, 156	
OK311100010190_00	Red River	49MILES	I124, N125, N133, I135, N137, I138, N1003	138, 385, 413, 215, 267	140	
OK311100010190_20	Red River	51MILES	I124, N125, N133, I135, I137, I138, I1003	138, 385, 413	140	
OK311100010230_00	Bills Creek	8MILES	I124, X125, I133, X135, N137, X1003	215	140	
OK311100020010_00	Hickory Creek	41MILES	I124, F125, F133, F135, N137, F138, X1003	215	140	
OK311100020090_00	Murray Lake, Anadarche Creek Arm, West	1,909ACRES	F124, I125, N133, I135, I137, I138, X1003, X1005	322	140	
OK311100030010_00	Walnut Bayou	24MILES	I124, F125, N133, F135, N137, I138, I1003	322, 215	140	
OK311100040010_00	Mud Creek	66MILES	I124, F125, N133, I135, N137, I138, I1003	322, 413, 215, 400	140	
OK311100040060_00	Fox Branch	5MILES	F124, N125, I133, I135, X137, I138, X1003	138, 385, 399	102	

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK311100040080_00	Mud Creek, West, Lower	28MILES	F124, F125, N133, X135, N137, X1003	322, 413, 215, 217, 400	92, 140, 156	
OK311200000010_00	Red River	37MILES	I124, N125, N133, N135, N137, N138, I1003	138, 385, 399, 372, 413, 215	140	
OK311200000060_00	Cow Creek	26MILES	I124, N125, F129, N133, N135, N137, I1003	399, 413, 215	140	
OK311200000080_00	Dry Creek	21MILES	F124, N125, N133, X135, N137, N138, X1003	138, 91, 322, 413, 215, 217, 400	102, 140, 92	
OK311200000110_00	Clarity Creek	8MILES	N124, I125, F129, N133, N135, X137, N138, X1003	317	70	
OK311200000120_00	Willow Creek	10MILES	N124, X125, N133, X135, X137, N138, X1003	317	70	
OK311210000030_00	Walker Creek	13MILES	F124, N125, I133, I135, X135, X137, F138, X1003	138, 399	102	
OK311210000140_00	Whisky Creek	10MILES	F124, F125, I133, X135, N137, X1003	215, 217	N/A	
OK311210000150_00	Cottonwood Creek	7MILES	I124, N125, I133, X135, N137, X1003	385, 215, 217, 400	N/A	
OK311300010020_00	Cache Creek, East	26MILES	I124, F125, N133, N135, N137, F138, I1003, X1005	413, 215, 217, 400	140	
OK311300010080_00	Walters Lake (Boyer)	148ACRES	X1003			
OK311300020034_00	Ninemile Creek, Middle Branch!	3MILES	I124, N125, N133, I135, I137, I138, X1003	413	140	
OK311300030070_00	Tahoe Creek	17MILES	N124, N125, N133, X135, N137, N138, X1003	385	140	
OK311310010010_00	Red River	88MILES	I124, N125, F129, N133, I135, N137, I1003	317, 385, 217	140, 92, 156	
OK311310010025_00	Hound Creek	8MILES	I124, N125, X133, I135, X137, X1003	138, 399	102	
OK311310020010_00	Cache Creek, West	28MILES	I124, N125, N133, X135, N137, N138, I1003	399, 267, 215, 217, 400	140	

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK3113100200060_00	Blue Beaver Creek	21MILES	X1003	F124, F125, I133, F135, N137, F138,	215	92, 140, 156
OK311310030050_00	Brush Creek	12MILES	N124, N125, N133, X135, N137, X1003	I124, N125, N133, I135, N137, N138,	317, 138, 385, 322, 413, 215, 217, 400	140, 84, 92
OK311500010020_00	Red River, North Fork	23MILES	I1003	I124, N125, N133, I135, N137, N138,	138, 399, 372, 215	140
OK311500010020_10	Red River, North Fork	62MILES	I1003	F124, N125, N133, X135, N137, N138,	138, 399, 413, 372	140
OK311500010050_00	Stinking Creek	17MILES	X1003	F124, N125, N133, X135, N137, N138,	138, 385, 413, 215, 217, 400, 302, 398	140, 156, 84, 92, 100
OK311500010110_00	Tepee Creek	20MILES	N124, N125, N133, X135, N137, X1003	I124, N125, I133, F135, N137, X1003	317, 138, 322, 215, 217, 400	140, 85, 92, 156
OK311500020040_00	Otter Creek, West	8MILES	X1003	F124, F125, N133, F135, N137, F138,	322, 215, 217, 400	85, 92, 140, 156
OK311500030010_00	Elk Creek	16MILES	I1003	I124, F125, I133, F135, N137, I138,	215	140
OK311500030040_00	Little Elk Creek	16MILES	X1003	N124, F125, N133, X135, N137, N138,	317, 322, 413, 215, 217, 400	85, 140, 92, 156
OK311510010010_00	Red River, North Fork	59MILES	I1003	I124, F125, I133, F135, N137, I138,	215	140
OK311510020060_00	Turkey Creek	19MILES	X1003	F124, F125, I133, F135, N138,	215, 400	92, 140, 156
OK311600010040_00	Sandy Creek (Lebos)	40MILES	I1003	I124, N125, F129, N131, I135, N139,	138, 385, 399, 372, 413, 215, 217, 400	140
OK311600020010_00	Red River, Salt Fork	14MILES	I1003	I124, F125, N133, I135, N137, N138,	372, 215, 400	140, 85, 92, 156
OK311600020010_10	Red River, Salt Fork	70MILES	I1003	I124, F125, N133, I135, N137, N138,	413, 372	140
OK311600020110_00	Bitter Creek	5MILES	N1003	F124, F125, F129, N131, X135, N139,	413, 215	140, 156, 68, 85, 92
OK311600020140_00	Cave Creek	14MILES	F124, F125, I133, F135, N137, X1003	215, 217	92, 140, 156	

OKWBDID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK311800000010_00	Red River, Elm Fork	63MILES	I1003	I124, F125, N133, F135, N137, N138,	372, 215, 217, 400	140
OK311800000070_00	Deer Creek	23MILES	X1003	F124, N125, N133, X135, N137, F138,	385, 413, 215, 217, 400	140, 156, 92
OK311800000130_00	Fish Creek	18MILES	X1003	F124, N125, N133, X135, N137, I138,	138, 385, 322, 413,	140, 156
OK410100010010_00	Red River	13MILES	I1003	I124, N125, N133, I135, F137, I138,	215, 400	
OK410100010010_10	Red River	23MILES		I124, N125, I133, I135, F137, I138, I1003	399, 413	140
OK410200010200_00	Little River	32MILES	I1003, X1006	I124, F125, N130, N133, F137, I138,	322, 413, 423	140
OK410200010210_00	Mud Creek	18MILES	I1003	I124, I125, F129, N133, X135, X139,	267	140
OK410210020020_00	Pine Creek Lake	3,750ACRES	X1003, X1006	F124, I125, N133, F134, I137, I138,	441	140
OK410210020140_00	Little River	29MILES	I1003, X1006	I124, F125, N130, F134, N137, F138,	163, 267, 441, 215	140
OK410210040010_00	Little River, Mountain Fork	9MILES	I1003	I124, F125, N130, N132, N137, F138,	267, 215	140
OK41021004010_10	Little River, Mountain Fork	1MILES	X1006	I124, F125, N132, N137, F138, I1003,	267	140
OK410210050020_00	Broken Bow Lake	14,200ACRES	X1003, X1005	F124, I125, N133, F134, I137, I138,	441	140
OK410210060010_00	Little River, Mountain Fork	1MILES	X1004	F124, F125, N130, N137, F138, I1003,	267, 413, 441, 215	140
OK410210060010_10	Little River, Mountain Fork	28MILES	X1004	N124, F125, N130, F137, F138, I1003,	267, 413, 441	140
OK410210080010_00	Glover River	34MILES	I1003, X1006	I124, F125, N130, F135, N137, F138,	267, 322, 215	140
OK410300010040_00	Raymond Gary Lake	263ACRES	F124, I125, N133, I135, I137, X1003	322, 441		140

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK410300020020_00	Hugo Lake	13,250	ACRES	F124, I125, N133, I135, I137, I138, X1003	413	140
OK410300020220_00	Ozzie Cobb Lake	116	ACRES	I135, I137, X1003, I124, I125	322, 441	140
OK410300030010_10	Kiamichi River	10	MILES	I124, F125, N133, F135, N137, F138, I1003	267, 215	140
OK410300030210_00	Dumpling Creek	14	MILES	F124, F125, N133, F135, N137, X1003	441, 400	140, 92, 156
OK410300030270_00	Tennille Creek	36	MILES	F124, F125, N133, X135, I137, N138, X1003	322, 441, 398	92, 140, 156
OK410300030580_00	Pine Creek	23	MILES	F124, F125, N133, F135, I137, X1003	441	140
OK410310010010_00	Kiamichi River	26	MILES	I124, F125, N133, F135, F137, F138, I1003	163, 267	140
OK410310010070_00	Dry Creek	6	MILES	F124, N125, I133, X135, N137, X1003	385, 217	140, 92
OK410310010220_00	Carl Albert Lake	183	ACRES	F124, I125, N133, I135, I137, I138, X1003	322, 441	140
OK410310010230_00	Tallihina Lake	25	ACRES	X124, I125, N133, I135, X137, X1003	413	102, 119
OK410310020010_00	Kiamichi River	21	MILES	I124, F125, N133, F135, F137, F138, I1003	267, 441	140
OK410310020010_10	Kiamichi River	29	MILES	I124, F125, N133, F135, F137, F138, I1003	267, 441	140
OK410310030090_00	Bolen Creek	9	MILES	F124, N125, N133, X135, N137, X1003	385, 441, 217, 400	140, 156
OK410400010010_00	Red River	13	MILES	I124, N125, N133, I135, N137, I138, I1003	138, 385, 399, 413, 215, 400	140
OK410400010010_20	Red River	5	MILES	I124, N125, I133, I135, N137, I138, I1003	138, 385, 399	140
OK410400010070_00	Muddy Boggy Creek	22	MILES	I124, F125, N133, F135, N137, I138, I1003	267, 413, 215, 400	140

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK410400030010_00	Clear Boggy Creek	23MILES	I1003	I124, F125, N133, F135, N137, I138,	267, 413, 215, 400	140
OK410400040170_00	Lake Creek	4MILES	I135	X137, F138, N1003, F124, I125, F133,	138, 399, 154, 267	102
OK410400050270_00	Muddy Boggy Creek	25MILES	I1003	I124, F125, N133, F135, N137, I138,	322, 413, 215, 400	140
OK410400050270_10	Muddy Boggy Creek	22MILES	I1003	I124, F125, N133, F135, N137, I138,	322, 413	140
OK410400060010_30	Muddy Boggy Creek	21MILES	X1003	I124, N125, I133, I135, X137, I138,	138, 399, 441	140, 102
OK410400070020_00	McGee Lake	3,810ACRES	X1005	F124, I125, N133, I137, I138, X1003,	322	140
OK410400080020_00	Atoka Lake	5,700ACRES	X1005	F124, I125, N133, I137, I138, X1003,	413	140
OK410600010010_00	Blue River	48MILES	I1003	I124, F125, N133, F135, N137, I138,	413, 215	140
OK410700000230_00	Eastman Creek	7MILES	I124, F125, I133, I135, N137, X1003	217, 400	N/A	
OK520500010110_00	Canadian River, North	59MILES	I1003	I124, F125, N133, F135, N137, I138,	267, 413, 215, 400	140
OK520500010170_00	Bad Creek	19MILES	X1003	F124, N125, N133, I135, X137, I138,	138, 322	102, 156, 140
OK520500010200_00	Alabama Creek	14MILES	X1003	F124, N125, F133, I135, X137, F138,	138, 399	102
OK520500010242_00	Clearview Creek	2MILES	I124, N125, X133, X135, X137, X1003	138, 399	140	
OK520500010270_00	Wetumka City Lake	175ACRES	F124, I125, N133, I135, I137, X1003	413	140	
OK520500010280_00	Flat Rock Creek	11MILES	X1003	I124, I125, N133, X135, X137, X138,	322	140
OK520500020010_00	Wewoka Creek	46MILES	I138, X1003	F124, N125, F129, N131, I135, N137,	138, 399, 413, 441, 217, 400	102, 140, 156, 84, 100

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK520500020020_00	Greasy Creek	18MILES	F124, F125, N133, F135, I137, X1003	322, 413, 441	140	
OK520500020027_00	Cheyarha Creek, East	3MILES	F124, N125, I133, I135, X137, I138, X1003	138, 399	102	
OK520500020090_00	Little Wewoka Creek	20MILES	I124, F125, N133, F135, X137, X138, X1003	413	140	
OK520500020210_00	Tiger Creek	5MILES	I124, N125, I133, I135, X137, I138, X1003	138	N/A	
OK520500020230_00	Carter Creek	7MILES	F124, N125, I133, I135, X137, I138, X1003	138, 399	102, 140	
OK520500020240_00	Wewoka Creek	2MILES	F124, N125, X131, I135, X139, I1003	138, 385, 399, 127	102, 85, 92, 140	
OK520500020240_10	Wewoka Creek	10MILES	F124, N125, F129, N131, I135, X139, X1003	385, 302	85, 92	
OK520500020250_00	Magnolia Creek	5MILES	F124, N125, I133, I135, X137, I138, X1003	138, 399	102	
OK520500020260_00	Salt Cedar Creek	1MILES	F124, N125, I133, I135, X137, I138, X1003	138, 399	102	
OK520500020260_20	Salt Cedar Creek	1MILES	F124, N125, I133, I135, X137, I138, X1003	138, 399	102	
OK520500020270_00	Wewoka Creek, Trib A!	5MILES	F124, N125, F133, I135, X137, I138, X1003	138, 399	102	
OK520510000010_00	Canadian River, North	46MILES	I124, F125, N133, F135, N137, F138, I1003	267, 413, 215, 400	140	
OK520510000050_00	Sand Creek	15MILES	I124, N125, X131, I135, I138, X139, X1003	138, 399	102	
OK520510000095_00	Turkey Creek, Trib A!	5MILES	F124, N125, F133, I135, X137, F138, X1003	138, 399	102	
OK520510000100_00	Turkey Creek	17MILES	F124, N125, N133, I135, I137, F138, X1003	138, 441	102, 140	
OK520510000105_00	Earsboro Creek	5MILES	F124, N125, X133, I135, X137, I138, X1003	138, 399	102	

OKWBID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK520510000110_00	Canadian River, North	3 MILES	X138, I1003	I124, F125, F129, N133, F135, N137,	267, 413, 215	N/A
OK520510000110_05	Canadian River, North	22 MILES	I1003	F124, N125, F129, N133, I135, N137,	399, 127	140
OK520510000110_10	Canadian River, North	14 MILES	X133	X135, X137, I1003, X124, X125, X129,	127, 267	140
OK520510000110_20	Canadian River, North	32 MILES	X1003	X124, X125, X129, N133, X135, X137,	322	140
OK520510000220_00	Tecumseh Lake	138 ACRES	X1003	F124, I125, N133, I135, I137, I138,	413	140
OK520510000300_00	Shawnee 2 Lake (North 2)	1,100 ACRES	X1003	F124, I125, N133, I135, I137, I138,	322	140
OK520520000010_00	Canadian River, North	4 MILES	N1003	I124, F125, F129, N133, F135, N137,	413, 441, 215, 400, 198	140
OK520520000010_20	Canadian River, North	14 MILES	I1003	X124, F125, X129, N133, F135, N137,	322, 413, 400	140
OK520520000010_30	Canadian River, North	10 MILES	X1003	X124, X125, X129, N133, X135, X137,	322	140
OK520520000010_40	Canadian River, North	10 MILES	X1003	X124, X125, F129, N133, X135, X137,	322	140
OK520520000030_00	Choctaw Creek	10 MILES	X1003	I124, I125, F129, N131, I135, I139,	322	140
OK520520000060_00	Crutchco Creek	4 MILES	I124, I125, N133, X135, I137, X1003	322	140	68, 84, 85,
OK520520000070_00	Crutchco Creek	4 MILES	I124, F125, N133, F135, N137, X1003	322, 215, 217	140	
OK520520000090_00	Crutchco Creek	2 MILES	X1003	N124, X125, X131, N133, X135, X139,	317	33
OK520520000110_00	Cherry Creek	7 MILES	I124, I125, N133, X135, X137, I1003	127, 163, 322, 372	140	
OK520520000150_00	Crooked Oak Creek	7 MILES	X1003	N124, N125, N133, X135, N137, N138,	317, 138, 322, 215, 217, 400, 398	84, 140, 85

OKWBID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK520520000210_00	Canadian River, North	9 MILES	X1003	N124, X125, N133, X135, I137, X138,	317, 322	70, 140
OK520520000240_00	Mustang Creek	9 MILES	I124, I125, I133, X135, N137, X1003	217		84, 140, 156
OK520520000250_00	Canadian River, North	9 MILES	X124, N125, I133, I135, N137, X138,	385, 400		140
OK520520000260_00	Overholser Lake	1,500 ACRES	F124, I125, N133, I135, I137, X1003	413		140
OK520530000010_10	Canadian River, North	101 MILES	I124, F125, I133, F135, N137, I138,	413, 215		140
OK520530000030_00	Shell Creek	9 MILES	I1003	F124, F125, N133, X135, N137, F138,	322, 215, 217, 400	92, 140, 156
OK520530000080_00	EI Reno Lake	170 ACRES	F124, I125, N133, I135, I137, X1003	413		140
OK520600010010_00	Canadian River	39 MILES	I1003	I124, N125, N133, I135, N137, I138,	399, 413, 215	140
OK520600010060_00	Factory Creek	6 MILES	N137	N138, X1003, F124, F125, I133, I135,	217, 400, 398	85, 92, 140, 156
OK520600020010_00	Canadian River	25 MILES	X1003	F124, N125, N133, I135, X137, I138,	385, 399, 441	140
OK520600020170_00	Julian Creek	6 MILES	X1003, X1004	F124, N125, I133, I135, N137, F138,	138, 217, 400	102, 140, 92, 156
OK520600020205_00	Red Springs Creek	1 MILES	X1003	F124, N125, I133, I135, X137, I138,	399	140
OK520600030030_00	Spring Brook	27 MILES	X1003	I124, F125, I133, F135, N137, N138,	400, 398	N/A
OK520610010010_00	Canadian River	12 MILES	N131, X133, X135	X137, X138, N139, I1003, I124, N125,	399, 413, 215	140
OK520610010010_05	Canadian River	33 MILES	I124, N125, N131, X135, N139, I1003	399, 413, 441	140	
OK520610010080_00	Willow Creek	9 MILES	F124, F125, N133, F135, N137, X1003	153, 413, 217, 400	140, 156, 92	

OKWBID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK520610010180_00	Bishop Creek	8MILES	I124, I125, N133, X135, N137, X1003	153	140	
OK520610020120_00	Buggy Creek	27MILES	F124, F125, F129, N133, F135, N137, X1003	215, 217, 400	N/A	
OK520610020150_00	Canadian River	3MILES	I124, N125, I131, N133, F135, N137, N138, X139, N1003	385, 399, 413, 215	140	
OK520610020150_10	Canadian River	36MILES	I124, N125, F129, N133, I135, N137, N1003	385, 399	140	
OK520610020165_00	Trib8!	6MILES	F124, N125, N133, I135, X137, N1003	138, 399, 96, 154	70	
OK520610030010_00	Walnut Creek	28MILES	N137, X1003, F124, F125, I133, F135	215	85, 92, 100, 140, 156	
OK520610030080_00	Walnut Creek, North Fork	17MILES	F124, F125, N133, F135, N137, N138, X1003	413, 215, 217, 400	140, 156, 92	
OK520620010010_00	Canadian River	42MILES	I124, I125, F129, N133, X135, N137, N1003	400	N/A	
OK520620010100_00	American Horse Lake	100ACRES	F124, I125, N133, I135, I137, X1003	322	140	
OK520620010120_00	Bear Creek	6MILES	F124, F125, I133, F135, N137, X1003	215, 217, 400	92, 140, 156	
OK520620020010_00	Canadian River	39MILES	I124, N125, F129, N133, I135, N137, N1003	399, 413, 215	140	
OK520620020070_00	Fiddlers Creek	7MILES	I124, N125, I133, I135, X137, I138, N1003	385, 399	155	
OK520620020080_00	Squirrel Creek	10MILES	I124, N125, I133, I135, X137, I138, N1003	385, 399	155	
OK520620020090_00	Trail Creek	14MILES	F124, N125, I133, X135, N137, X1003	385, 399, 215, 217, 400	140, 155, 92, 156	
OK520620030010_00	Canadian River	38MILES	F124, N125, F129, N133, X135, N137, N1003	138, 385, 215	140, 156	
OK520620030020_00	Lone Creek	13MILES	F124, N125, F133, N135, N137, I138, N1003	385, 399, 215, 217	140, 155, 92, 156	

OKWID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK520620030050_00	Red Trail Creek	8MILES	F124, N125, I133, X135, N137, X1003	385, 215, 217, 400	N/A	
OK520620030110_00	Red Creek	12MILES	F124, N125, I133, X135, N137, F138, X1003	385, 215, 217	140, 155, 156	
OK520620040050_00	Hackberry Creek	16MILES	F124, N125, I133, X135, N137, I138, X1003	385, 399, 215, 217	140, 155, 92, 156	
OK520620050160_00	Commission Creek	13MILES	F124, F125, I133, X135, N137, I138, X1003	215, 217	140, 156	
OK520620060010_00	Deer Creek	56MILES	I124, F125, I133, F135, N137, I138, X1003	215, 217	N/A	
OK520700010110_00	Grave Creek	16MILES	F124, N125, F133, I135, X137, I138, X1003	138	102	
OK520700010140_00	Coal Creek	22MILES	I124, X125, F129, N133, X135, N137, X1003	413, 215	140	
OK520700010180_00	Henryetta Lake	450ACRES	F124, I125, N133, I135, I137, I138, X1003	441	140	
OK520700020010_00	Canadian River, Deep Fork	43MILES	N137, I138, I1003, I124, F125, N133, F135	413, 215	140	
OK520700020040_00	Okmulgee Lake	668ACRES	F124, I125, N133, I135, I137, I138, X1003	322	140	
OK520700020080_00	Adams Creek	14MILES	I124, I125, N133, I135, X137, X1003	322	140	
OK520700020150_00	Salt Creek	12MILES	I124, N125, N133, X135, X137, X1003	138, 322	140	
OK520700020155_00	Begger Creek!	4MILES	F124, N125, I133, I135, X137, I138, X1003	138, 399	102	
OK520700020200_00	Nuyaka Creek	22MILES	I124, I125, N133, X135, X137, X138, X1003	322, 413	140	
OK520700030020_00	Walnut Creek	15MILES	I124, F125, N133, F135, X137, X1003	413	140	
OK520700030270_00	Hilliby Creek	13MILES	I124, I125, N133, X135, X137, X1003	230	157	

OKWID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK520700040010_00Fork	Canadian River, Deep	17MILES	I1003	I124, F125, N133, F135, N137, N138,	267, 215	140
OK520700040220_00Prague Lake	Prague Lake	225ACRES	F124, I125, N133, I135, I137, X1003	F124, I125, N133, I135, I137, I138,	322	140
OK520700040370_00Meeker Lake	Meeker Lake	250ACRES	X1003	F124, I125, N133, I135, I137, I138,	413	140
OK520700050020_00Bellcow Creek	Bellcow Creek	6MILES	X1003	I124, X125, I133, X135, N137, X138,	215	140
OK520700050060_00Chandler Lake	Chandler Lake	129ACRES	I124, I125, N133, I135, I137, I138, X1003	I124, I125, N133, I135, I137, I138, X1003	322	140
OK520700050080_00Bellcow Creek, North	Bellcow Creek, North	5MILES	N124, X125, N133, X135, X137, X1003	N124, X125, N133, X135, X137, X1003	317	124
OK520700050140_00Captain Creek	Captain Creek	4MILES	X1003	F124, F125, I133, F135, N137, F138,	217	N/A
OK520700050200_00Opossum Creek	Opossum Creek	7MILES	F124, F125, N133, F135, I137, X1003	N124, X125, N133, X135, X137, N138,	413	140, 156
OK520700050250_00Chandler Lake, NW Trib!	Chandler Lake, NW Trib!	2MILES	X1003	N124, X125, N133, X135, X137, N138,	317	124
OK520700060050_00Browns Creek	Browns Creek	14MILES	I124, I125, N133, I135, X137, X1003	F124, F125, X131, I133, X135, N137,	322	140
OK520700060130_00Little Deep Fork Creek	Little Deep Fork Creek	5MILES	F138, X139, X1003	F124, F125, N133, F135, N137, X1003	215, 217, 400	92, 140, 156
OK520700060130_10Little Deep Fork Creek	Little Deep Fork Creek	24MILES	X1003	F124, F125, N133, F135, N137, X138,	413	140
OK520700060140_00Cattfish Creek	Cattfish Creek	10MILES	I124, N125, N133, X135, X137, X1003	I124, N125, N133, X135, X137, X1003	399, 413	N/A
OK520700060210_00Spring Creek, West	Spring Creek, West	7MILES	X1003	I124, N125, I133, I135, X137, I138,	138, 399	102
OK520710010030_00Coon Creek	Coon Creek	12MILES	I124, I125, N133, X135, I137, X1003	I124, I125, I133, X135, N137, I138,	153	140
OK520710020030_00Spring Creek	Spring Creek	8MILES	X1003	X1003	217	84, 140

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK520710020060_00	Canadian River, Deep Fork	10MILES		F124, F125, I133, F135, N137, N138, X1003, X1005	215, 217, 400, 398	84, 140
OK520800010010_00	Little River	25MILES	I1003	I124, F125, N133, F135, N137, I138,	267, 372, 413, 215, 400	140
OK520800010050_00	Bird Creek	14MILES		I124, I125, N131, I135, I139, X1003	230, 441	157, 140
OK520800010055_00	Kight Creek	5MILES	X137	I138, X1003, F124, N125, I133, I135,	138, 399	102
OK520800010060_00	Cudjo Creek	6MILES	X1003	F124, N125, N133, I135, X137, I138,	138, 399, 441	102, 140
OK520800010062_00	Bear Cub Creek	1MILES		F124, F125, N133, F135, X137, X1003	441	102
OK520800010090_00	Little River	28MILES	X1003	I124, N125, I133, I135, X137, I138,	138	102
OK520800030010_00	Salt Creek	39MILES	X1003	I124, N125, I133, I135, X137, I138,	138	102
OK520800030070_00	Bruno Creek	10MILES	X1003	I124, N125, I133, I135, X137, I138,	138, 399	102
OK520800030080_00	Popshego Creek	4MILES	I135	X137, N138, X1003, F124, N125, I133,	138, 399, 104	102
OK520800030120_00	Blacksmith Creek	6MILES	X1003	F124, N125, F133, I135, X137, I138,	138, 399	102
OK520810000020_00	Thunderbird Lake	6,070ACRES	X1005	F124, I125, N133, I137, F138, X1003,	322, 413	140
OK520810000100_00	Elm Creek	1MILES	X1005	F124, F125, I133, N137, F138, X1003,	217	N/A
OK520810000130_00	Stanley Draper Lake	2,900ACRES	X1005	F124, I125, N133, I137, X138, X1003,	413	140
OK520810000175_00	Moore Creek	4MILES	X1003	F124, N125, I133, I135, X137, F138,	138, 399	102
OK620900010170_00	Cimarron River	2MILES	I1003	I124, F125, F129, N133, F135, N137,	413, 400	140

OKWBID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK620900010170_10	Cimarron River	26 MILES	MILES	F125, F129, N133, F135, N137, I1003, I124	413	140
OK620900010180_00	Lagoon Creek	25 MILES	MILES	F124, F125, I133, F135, N137, X1003	215, 217	N/A
OK620900010220_00	Buckeye Creek	13 MILES	MILES	I124, F125, I133, I135, N137, X1003	400	N/A
OK620900010250_00	Tiger Creek	10 MILES	MILES	F124, N125, F133, I135, X137, X1003	138, 399	102
OK620900010290_00	Euchee Creek	22 MILES	MILES	F124, F125, F129, N133, I135, N137, X1003	413, 441, 215	140, 156, 85, 92
OK620900010310_00	Cottonwood Creek	6 MILES	MILES	I124, X125, F129, N133, X135, N137, X1003	322, 245, 217, 400	140
OK620900020020_00	Salt Creek	17 MILES	MILES	I124, I125, I133, X135, N137, I138, X1003	215, 217	92, 140, 156
OK620900020050_00	Council Creek	22 MILES	MILES	F124, F125, I133, F135, N137, F138, X1003	217, 400	N/A
OK620900020120_00	Cushing Lake	591 ACRES	ACRES	F124, I125, N133, I135, I137, I138, X1003	413	140
OK620900030010_00	Cimarron River	42 MILES	MILES	I124, F125, F129, N133, F135, N137, X1003	413, 215	N/A
OK620900030080_00	Dugout Creek	14 MILES	MILES	I124, I125, N133, X135, N137, I138, X1003	413, 217	140, 156, 92
OK620900030260_00	Beaver Creek, West	13 MILES	MILES	F124, F125, N133, I135, N137, I138, X1003	413, 215, 217, 400	140, 156, 92
OK620900030270_00	Beaver Creek, Middle	10 MILES	MILES	I124, N125, I133, I135, X137, I138, X1003	138, 399	102
OK620900040040_00	Stillwater Creek	4 MILES	MILES	I124, I125, I133, I135, X137, N138, X1003	215, 217, 302	84, 85, 92, 140, 156
OK620900040050_00	Little Stillwater Creek	14 MILES	MILES	I124, I125, I133, I135, X137, N138, X1003	302	85, 92
OK620900040070_00	Stillwater Creek	6 MILES	MILES	I137, I138, X1003	322, 413, 217	140, 92, 100, 156

OKWID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK620900040070_10	Stillwater Creek	16 MILES	X1003	X124, X125, X129, N131, X135, X139,	322, 413	140
OK620900040270_00	Stillwater Creek	2 MILES	I137, I138, I139, X1003, X1005	F124, F125, F129, N131, N133, F135, F124, F125, N133, F135, I137, X138,	322, 413	140, 92, 156
OK620900040270_10	Stillwater Creek	13 MILES	X1003, X1005	F124, I125, N133, I135, I137, I138,	322, 413	140
OK620900040280_00	Carl Blackwell Lake	3,370 ACRES	X1003, X1005	F124, I125, N133, I135, I137, I138,	413	140
OK620910010010_00	Cimarron River	8 MILES	I1003	I124, F125, F129, N133, F135, N137,	413, 215, 400	140
OK620910020010_00	Cimarron River	59 MILES	I1003	I124, F125, F129, N133, F135, N137,	372, 215, 217, 400	140
OK620910020100_00	Salt Creek	4 MILES	I1003	I124, N125, F129, I133, I135, I137, I138,	385	127, 140
OK620910020250_00	Deep Creek	26 MILES	X1003	I124, I125, I133, X135, N137, I138,	217	92, 140, 156
OK620910020270_00	Elm Creek	14 MILES	X1003	F124, N125, N133, F135, N137, I138,	385, 413, 215, 217	140, 156, 92
OK620910020310_00	Indian Creek	17 MILES	I1003	I124, I125, I133, X135, N137, I138,	217	85, 140, 156
OK620910030010_00	Skeleton Creek	34 MILES	I1003	I124, F125, N133, F135, N137, I138,	413, 215, 400	140
OK620910030040_00	Otter Creek	30 MILES	X1003	F124, F125, N133, F135, N137, F138,	413, 215	140, 156, 85, 92
OK620910030240_00	Skeleton Creek	20 MILES	I1003	I124, F125, I133, F135, N137, N138,	215, 302	84, 85, 92, 140, 156
OK620910040010_00	Cottonwood Creek	22 MILES	X1003	F124, F125, I133, X135, N137, F138,	215, 217	68, 84, 85, 140, 156
OK620910040010_20	Cottonwood Creek	24 MILES	X1003	F124, F125, N133, F135, N137, X138,	413	140
OK620910040080_00	Liberty Lake	167 ACRES	X1003	F124, I125, N133, I135, I137, I138,	322	140

OKWBID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK620910040100_00	Chisholm Creek	21 MILES	X1003	I124, F125, I133, F135, N137, N138,	215, 302	N/A
OK620910040120_00	Deer Creek	13 MILES	N1003	F124, F125, N133, F135, N137, F138,	153, 413, 215, 217	140, 156, 68, 84, 85
OK620910040140_00	Bluff Creek	9 MILES	X1003	I124, X125, I133, X135, N137, I138,	215, 217, 400	140, 84
OK620910050010_00	Kingfisher Creek	47 MILES	F124, F125, N133, F135, N137, X1003	413, 215, 217	140, 156, 92	
OK620910050020_00	Trail Creek	15 MILES	I124, F125, I133, F135, N137, X1003	215, 217	N/A	
OK620910050080_00	Dead Indian Creek	24 MILES	X1003	I124, I125, I133, X135, N137, I138,	217	92, 100, 140, 156
OK620910060010_00	Turkey Creek	83 MILES	X1003	F124, F125, N133, F135, N137, N138,	413, 215, 400, 398	140, 156, 84, 85, 92, 100
OK620910060020_00	Little Turkey Creek	11 MILES	F124, F125, N133, F135, N137, X1003	322, 413, 215, 217, 400	92, 140, 156	
OK620910060030_00	Buffalo Creek	14 MILES	I124, I125, N133, I135, X1003, N137	322, 413, 400	140	
OK620910060110_00	Clear Creek	5 MILES	I124, I125, N133, I135, N137, X1003	413, 400	140	
OK620920010010_00	Cimarron River	43 MILES	I1003	I124, N125, F129, N133, I135, N137,	138, 413, 215, 217	140
OK620920010080_00	Cottonwood Creek	22 MILES	X1003	F124, F125, N133, F135, N137, N138,	413, 215, 217, 400	140, 156, 92
OK620920010130_00	Griever Creek	20 MILES	X1003	F124, F125, I133, F135, N137, I138,	215, 217	92, 140, 156
OK620920010180_00	Main Creek	19 MILES	X1003	I124, I125, I133, X135, N137, I138,	215, 217	92, 140, 156
OK620920020010_00	Cimarron River	33 MILES	X1003	I124, N125, F129, I133, I135, X137,	138	140
OK620920020080_00	Long Creek	22 MILES	X1003	I124, I125, I133, X135, N137, I138,	215, 217	140, 156

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK620920020170_00	Traders Creek	22MILES	X1003	F124, F125, I133, F135, N137, F138,	215	140, 156
OK620920030010_00	Cimarron River	24MILES	I1003	I124, N125, F129, I133, I135, N137,	138, 215, 217, 400	140
OK620920040010_00	Eagle Chief Creek	74MILES	F124	F125, I133, F135, N137, F138, X1003,	215, 217	68, 85, 92, 100, 140, 156
OK620920040170_00	Lojo creek	5MILES	X1003	F124, N125, I133, I135, X137, I138,	385	140
OK620920050010_00	Buffalo Creek	49MILES	N137	F138, X1003, F124, F125, I133, I135,	215, 217	N/A
OK620920050050_00	Sand Creek	26MILES	I124, I125, I133, I135, N137, I138,	X1003 215		92, 140, 156
OK620920050060_00	Selman Creek	11MILES	I124, N125, I133, I135, I137, I138,	X1003 385		140
OK620920050070_00	Little Buffalo Creek	4MILES	I124, N125, I133, I135, X137, X1003	385		155
OK620930000010_00	Cimarron River	38MILES	I1003	I124, N125, N133, N135, N137, I138,	138, 399, 372, 215, 217, 400	140, 156
OK620930000100_00	Crooked Creek	6MILES	X1003	I124, I125, I133, X135, N137, I138,	215, 217	140, 156
OK621000010010_00	Arkansas River, Salt Fork	11MILES	I1003	I124, F125, N133, F135, N137, I138,	322, 413, 215	140
OK621000010010_30	Arkansas River, Salt Fork	34MILES	I1003	I124, F125, N133, F135, N137, I138,	413	140
OK621000010060_00	Bird's Nest Creek	23MILES	X1003	F124, N125, F133, I135, X137, I138,	138, 399	102
OK621000020040_00	Wild Horse Creek	25MILES	I133, X135, N137, X1003, I124, I125	215, 217	84, 85, 92, 140, 156	
OK621000020130_00	Spring Creek	6MILES	F124, F125, I133, F135, N137, X1003	215, 217, 400	N/A	
OK621000030010_00	Bois d' Arc Creek	37MILES	F124	F125, I133, I135, N137, F138, X1003,	215, 217, 400	N/A

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK621000030050_00	Cattle Creek, West	9 MILES	X1003	I124, N125, I133, I135, X137, I138,	385, 399	140
OK621000040010_00	Deer Creek	41 MILES	I133, I135, N137, I138, X1003, I124, I125	217		92, 140, 156
OK621000050010_00	Pond Creek	60 MILES	I124, I125, I133, I135, N137, I138, X1003	215, 217		92, 140, 156
OK621000060060_00	Duel Creek	10 MILES	I124, N125, I133, I135, X137, X1003	385		140
OK621010010010_00	Arkansas River, Salt Fork	21 MILES	I124, N125, I133, I135, I137, I138, X1003	138, 399		140
OK621010010090_00	Clay Creek	9 MILES	I124, I125, F129, I133, X135, N137, X1003	215, 217		92, 140, 156
OK621010010160_00	Arkansas River, Salt Fork	15 MILES	I124, F125, N133, F135, N137, I138, I1003	372, 413, 215, 217, 400	140	140
OK621010010230_00	Turkey Creek	25 MILES	F124, N125, N133, I135, N137, F138, I1003	385, 399, 322, 215, 217	140, 92, 100, 156	140
OK621010010240_00	Boggy Creek	16 MILES	I124, N125, I133, I135, X137, I138, X1003	385, 399		140
OK621010010270_00	Yellowstone Creek	22 MILES	F124, N125, N133, X135, N137, F138, X1003	385, 399, 413, 215, 217	140, 92, 156	
OK621010020010_00	Sandy Creek	18 MILES	F124, F125, I133, F135, N137, N138, X1003	215, 217, 400, 398	N/A	
OK621010030010_00	Medicine Lodge River	13 MILES	I124, I125, I133, X135, N137, I138, X1003	215, 217		140, 156
OK621010030030_00	Driftwood Creek	39 MILES	I124, I125, I133, X135, N137, I138, X1003	215, 217		92, 140, 156
OK621010030080_00	Capron Creek, North	8 MILES	I124, N125, I133, I135, X137, I138, X1003	385, 399		140
OK6211000000010_00	Chikaskia River	5 MILES	F124, F125, I133, X135, N137, F138, X1003	217		84, 85, 140, 156
OK621100000010_00	Chikaskia River	36 MILES	I124, F125, N133, F135, N137, I138, I1003	127, 267, 413, 215, 400	140	

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK621100000030_00	Duck Creek	26MILES	I135	N137, F138, X1003, F124, N125, I133,	385, 215, 217	N/A
OK621100000033_00	Duckling Creek	5MILES	X1003	I124, N125, I133, I135, X137, I138,	138, 399	102
OK621100000100_00	Bitter Creek	23MILES	X1003	F124, N125, I133, I135, N137, F138,	138, 385, 215, 217	N/A
OK621100000130_00	Scatter Creek	8MILES	X1003	I124, N125, I133, I135, X137, I138,	138, 399	102
OK621200010020_00	Keystone Lake	5,903ACRES	X1003	F124, I125, F129, N133, I135, I137,	413	140
OK621200010200_00	Arkansas River	38MILES	I1003	I124, F125, N133, F135, N137, I138,	413, 215	140
OK621200010400_00	Gray Horse Creek	16MILES		F124, F125, N133, F135, N137, X1003	413, 215, 217, 400	92, 140, 156
OK621200020020_00	Doga Creek	10MILES	X1003	F124, F125, N133, F135, N137, F138,	413, 215, 217, 400	140, 156
OK621200030010_00	Black Bear Creek	68MILES	I1003	I124, F125, N133, F135, N137, I138,	267, 413, 215, 217, 400	140, 68, 84, 85, 92, 100, 156
OK621200030040_00	Camp Creek	27MILES	X1003	F124, N125, F133, I133, I135, N137, I138,	400	N/A
OK621200030396_00	Lucien Creek	4MILES	X1003	F124, N125, F133, I135, X137, F138,	138, 385, 399	102
OK621200040010_00	Salt Creek	61MILES	X1003	I124, F125, I133, F135, N137, F138,	215, 217, 400	140, 84, 92, 156
OK621200040040_00	Fairfax Lake	111ACRES	X1003	F124, I125, N133, I135, I137, I138,	322	140
OK621200040070_00	Little Chief Creek	13MILES	X1003	F124, F125, I133, F135, N137, N138,	400, 398	92, 140, 156
OK621200050010_00	Red Rock Creek	37MILES		F124, F125, N133, F135, N137, X1003	413, 217	84, 85, 92, 140, 156
OK621210000010_00	Arkansas River	11MILES	I138, I1003	I124, N125, F129, N133, I135, N137,	385, 399, 413, 215, 400	140

OKWID	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK621210000020_00	Kaw Lake	5,680 ACRES	X1003	F124, I125, N133, I135, I137, X138,	413	140
OK621210000050_00	Beaver Creek	30 MILES	X1003	I124, F125, N133, F135, N137, I138,	322, 215, 217	140, 156
OK621210000270_00	Chilocco Creek	16 MILES	I124, I125, N133, X135, N137, X1003	322, 215, 217	85, 92, 140, 156	
OK720500010010_00	Canadian River, North	46 MILES	I1003	I124, F125, N133, F135, N137, I138,	413, 215	140, 156
OK720500010070_00	Bent Creek	20 MILES	I133	X135, N137, I138, X1003, I124, N125,	385, 215, 217	140, 92, 156
OK720500010140_00	Canadian River, North	21 MILES	I124, F125, I133, F135, N137, I1003	215	140	
OK720500010150_00	Persimmon Creek	13 MILES	X1003	F124, F125, I133, F135, N137, F138,	215, 217, 400	N/A
OK720500020010_00	Beaver River (North Canadian)	43 MILES	I124, F125, I133, F135, N137, I1003	215	140	
OK720500020050_00	Otter Creek	14 MILES	X1003	I124, I125, I133, X135, N137, I138,	215, 217	92, 140, 156
OK720500020070_00	Clear Creek	30 MILES	I1003	I124, F125, I133, F135, N137, I138,	215, 217, 400	92, 140, 156
OK720500020100_00	Spring Creek	7 MILES	I124, I125, I133, X135, N137, X1003	215, 217	92, 100, 140, 156	
OK720500020130_00	Kiowa Creek	35 MILES	I1003	I124, F125, I133, F135, N137, I138,	413, 215, 217, 400	140, 100, 156
OK720500020140_00	Beaver River (North Canadian)	39 MILES	I124, F125, I133, F135, N137, I1003	215	140	
OK720500020250_00	Duck Pond Creek	41 MILES	X1003	I124, I125, I133, X135, N137, I138,	215, 217	92, 140, 156
OK720500020290_00	Beaver River (North Canadian)	31 MILES	I124, N125, N133, I135, N137, I1003	138, 385, 399, 372, 215, 217, 400	140	
OK720500020300_00	Clear Creek	23 MILES	X1003	F124, F125, N133, F135, N137, F138,	322, 215	92, 100, 140, 156

OKWBD	Name	Size	Unit	Designated Uses	Impairments	Potential Sources
OK720500020450_00	Beaver River (North Canadian)	28MILES	I124, N125, I133, I135, N137, I1003	138, 399, 215, 217, 400	140	
OK720500020500_00	Palo Duro Creek	16MILES	I124, N125, N133, I135, N137, I138, I1003	138, 385, 399, 322, 372, 413, 215, 217, 400	140, 92, 100, 156	
OK720500020500_10	Palo Duro Creek	4MILES	I124, N125, X1003, N133, I135, N137, I138	138, 91, 322, 215, 217, 400	140, 92, 100, 156	
OK720500030010_00	Wolf Creek	52MILES	I124, F125, I133, F135, N137, I138, I1003, X1005	413, 215, 217	140, 85, 92, 100, 156	
OK720500030080_00	Buzzard Creek	10MILES	F124, F125, I133, F135, N137, I138, X1003, X1005	217	92, 140, 156	
OK720510000190_00	Beaver River (North Canadian)	98MILES	I124, F125, I133, F135, N137, I138, I1003, X1006	215, 217	140	
OK720510000275_00	Currumpa Creek!	13MILES	F124, F125, N133, X135, N137, X1003	91, 322, 215, 217, 400	140, 156	
OK720900000010_00	Cimarron River	47MILES	F124, F125, I133, X135, N137, X1003, X1006, F138	217	140, 156	
OK720900000100_00	Cold Springs Creek	33MILES	I124, I125, N133, X135, I137, I138, X1003	322	140, 156	
OK720900000180_00	Cimarron River	19MILES	I125, N133, X135, N137, F138, X1003, X1006, F124	322, 215, 217, 400	140, 156	
OK720900000200_00	Carrizo Creek, South	22MILES	I124, I125, N133, X135, I137, I138, X1003	322	140	

